Report of the Committee of Visitors
Division of Chemical Sciences, Geosciences and Biosciences
of the
Basic Energy Sciences
U.S. Department of Energy to

the

Basic Energy Sciences Advisory Committee

Review of FY 2014, 2015 and 2016

Rockville, Maryland
March 28 – 30, 2017

Executive Summary

A Committee of Visitors (COV), under the guidance of the Basic Energy Sciences Advisory Committee (BESAC), reviewed the programs in the Chemical Sciences, Geosciences, and Biosciences (CSGB) Division of the Office of Basic Energy Sciences (BES) covering the fiscal years 2014, 2015, and 2016.

Seventeen participants plus the chair met at the Rockville Hilton on March 28 – 30, 2017. The charge given to the COV by Prof. John Hemminger, Chair of the Basic Energy Sciences Advisory Committee (BESAC) was to: (i) assess the efficacy and quality of the processes used to solicit, review, recommend, and document proposal actions and monitor active projects and programs, (ii) within the boundaries defined by the DOE missions and available funding, comment on how the award process has affected the breadth and depth of portfolio elements, and the national and international standing of the portfolio elements. The COV was chaired by Dr. Bruce Kay. The format was similar to those of previous COV reviews of programs in the Office of Science reviewing the 3 programmatic teams within the CSGB Division: Fundamental Interactions, Photochemistry and Biochemistry, and Chemical Transformations. The review excluded work performed in Energy Frontier Research Centers (EFRCs), the Fuels from Sunlight Energy Innovation Hub, and the Office of Science Early Career Research Program.

The COV evaluated the processes of solicitation, review, monitoring, and documentation to be outstanding, clearly reflecting the competency and dedication of the Program Managers. The scientific programs, including the scope of research, and the competency of the principal investigators were judged to be exceptional. Importantly, the programs are mission-oriented but are sufficiently adaptive and flexible to create an environment conducive to innovative and impactful scientific discovery. The Office of Science and BES can and should be proud of the long-standing and enduring scientific achievements of the CSGG program, clearly reflecting the quality and commitment of the Division management and staff. The COV applauds the CSGB staff for their heroic efforts in managing their programs and ensuring that the COV review ran efficiently.

The COV has three major recommendations:

- The COV strongly recommends providing the opportunity and resources for Program Managers to travel to scientific conferences and visit laboratories of researchers in their programs to maintain cutting-edge portfolios and identify emerging research opportunities.
- The COV recommends continued improvement of the PAMS systems with the addition of modules needed to facilitate analysis of demographic data critical for determining how the reviewing process could be improved and the diversity of the investigator pool could be broadened.
- The COV commends CSGB's initial implementation of strategic planning and encourages broadening the scope to identify synergies and new research opportunities among various CSGB teams and with other BES divisions.

Table of Contents

1. Introduction

This report documents the findings from a Committee of Visitors (COV) that was assembled under the auspices of the Basic Energy Sciences Advisory Committee (BESAC) to evaluate the processes and programs of the Division of Chemical Sciences, Geosciences, and Biosciences in the Office of Basic Energy Sciences (BES). The COV met at the Rockville Hilton in Rockville, Maryland, for two and one-half days from March 28 – 30, 2017. This was the sixth in the series of COV reviews of the CSGB Division; the first held in January 2002, with subsequent reviews in 2005, 2008, 2011, and 2014.

2. The Charge to the Committee of Visitors

The charge to the COV was established in a letter from the Chair of BESAC to Dr. Bruce Kay, who had agreed to chair the COV. The letter is attached as Appendix I. The charge was to address the operations of the CSGB Division during fiscal years 2014, 2015, and 2016. The components of the Division to review were:

- Atomic, Molecular, and Optical Sciences
- Gas Phase Chemical Physics
- Condensed Phase and Interfacial Molecular Science
- Computational and Theoretical Chemistry
- Catalysis Science
- Separations and Analysis
- Heavy Element Chemistry
- Geosciences
- Solar Photochemistry
- Photosynthetic Systems
- Physical Biosciences

The committee was not charged to consider activities such as the Energy Frontier Research Centers (EFRCs), the Fuels from Sunlight Energy Innovation Hub, or the Office of Science Early Career Research Program.

The COV was asked to evaluate the following major elements: (i) For both DOE laboratory projects and grants programs, assess the efficacy and quality of the process used to solicit, review, recommend, and document proposal actions and to monitor active projects and programs; (ii) Within the boundaries defined by the DOE missions and available funding, comment on how the award process has affected the breadth and depth of portfolio elements, and the national and international standing of the portfolio elements.

3. The Committee Membership

The COV membership was selected by the COV chair, Dr. Bruce Kay, in consultation with BES staff to represent a cross-section of experts in scientific fields relevant to the activities supported by the CSGB Division. A balance was achieved between researchers who currently receive funding from BES and those that do not (12 and 6, respectively), between academic

(12), national laboratory (4) and other federal agencies (2), and between those who have previously served on a COV and those who have not (3 and 15, respectively).

A full listing of the COV members and their panel assignments for both the first and second reading of the folders is given in Appendix II and Appendix III, respectively. The COV consisted of a total of 18 members, (17 plus the chair), divided between 3 panels. For each panel a Lead was selected, who was responsible for leading the team to produce a written summary of findings, comments, recommendations, and ratings of progress toward achieving long-range BES goals. The programs were divided as follows:

Panel 1: Fundamental Interactions – Panel Lead: Anne McCoy
- Atomic, Molecular, and Optical Sciences
- Gas Phase Chemical Physics
- Condensed Phase and Interfacial Molecular Science
- Computational and Theoretical Chemistry

Panel 2: Photochemistry and Biochemistry – Panel Lead: Bob Blankenship
- Solar Photochemistry
- Photosynthetic Systems
- Physical Biosciences

Panel 3: Chemical Transformations – Panel Lead: Mike Hochella
- Catalysis Science
- Separations and Analysis
- Heavy Element Chemistry
- Geosciences

4. The Review Process

The COV assembled in Rockville at 8:30 AM on Tuesday, March 28, and adjourned at 11:00 AM on Thursday, March 30. The agenda for the COV is attached as Appendix IV.

Prior to convening in Rockville, each COV member was supplied with the link to the COV module in the Portfolio Analysis and Management System (PAMS) system. The Reference Materials section of the COV module contained a comprehensive set of information pertaining to: the COV process, the report template, the core research activities of the Division, the procedures used by BES in reviewing both university and national laboratory applications, copies of the plenary presentations, and a copy of the 2014 CSGB Division COV report together with the response from BES. This information was extremely useful and easy to access via the COV website. In addition, the COV chair and panel leads participated in three conference calls with the CSGB Division Director and Team Leads prior to the COV. These conference calls facilitated defining the roles of COV panel members and discussing and finalizing procedural details of the review.

The COV began with a reiteration of the charge to the committee given by the BESAC chair,

Prof. John Hemminger. Dr. Harriet Kung, Director of BES, presented an overview of BES followed by an overview of the CSGB Division by the Division Director, Dr. Bruce Garrett. Dr. Gail McLean briefed the committee on review procedures and Dr. Jeff Krause presented information on how to use the (PAMS) system. The panel members were then presented with further details of the overall review process and schedule by the COV Chair, Dr. Bruce Kay, before adjourning to their panel break-out rooms.

The first reading of the folders began with an overview of the Team programs by the CSGB Division Team Lead. Each panel was supplied with a list of proposal folders to evaluate the CSGB Division award/decline/monitor process. These proposals were distributed among four types of programmatic decisions: easy awards, easy declines, difficult awards, and difficult declines, with 6 – 8 proposals in each program area for a total of about 30 proposals per panel. The projects included laboratory-based field work proposals (FWPs) and university grants.

The panels were free to request any additional information that they felt would help them in their evaluation process. After the initial discussion period, the program managers were not present during the review process but were on hand to answer questions or provide additional input as needed.

The first reading of the files occupied the remainder of the first day providing a thorough examination of the programs most closely related to the expertise of the participating COV panelists. Each panel prepared preliminary conclusions that were discussed with the COV chair, and shared with BES senior management. The checklist used by the panels during their review of the files is presented in Appendix V; it correlates with the report templates used by the panels as presented in Appendix VI.

On the afternoon of the second day, the panel members were assigned to different panels outside of their primary expertise for the second read. The panel leads, however, did not rotate to add continuity and context for the second read members. The second read allowed for further refinement of issues considered important in the preliminary findings of the first read.

At the end of the afternoon of the second day, the original members of each panel reconvened with the panel lead to merge and finalize the findings from the first and second reads, and to prepare materials for the final report. The entire COV then met in executive session to discuss and reach consensus on the major findings and recommendations.

On the third day the entire COV met and presented the major findings and recommendations to BES leadership, CSGB Division management, and the CSGB Division program managers. Following the presentation of the COV findings and recommendations by the COV Chair, there was a period of open and productive discussion between COV members and BES leadership and staff.

The written reports from the panels (Appendix VII) and the conclusions and recommendations drawn from the executive session provided the basis for this report.

5. Major Findings of the COV

1. The COV realizes that the processes of solicitation, review, documentation, and monitoring of proposals by DOE Program Managers is work that is intricate and difficult, requiring astute scientific insight, not-to-be-taken-for-granted organizational skills both within and outside of DOE, deep understanding of organizational mission (both now and for the future), and thoughtful human interaction skills. This COV has found the Program Managers, although at various stages in their careers in these positions, to be dedicated, focused, professional, committed and effective to serve the DOE and the nation to the very best of their abilities. We truly commend their efforts in supporting current scientific efforts with a vision to future endeavors.

2. The COV judges that DOE continues to maintain the breadth and depth of the portfolio elements, as well as the quality of the science and principal investigators, to be excellent. The Program Managers have successfully balanced the mission-oriented nature of the DOE with the flexibility required for high-quality scientific research. For example, the program managers have specifically encouraged innovative and unique research directions to broaden the portfolio. Additionally, the portfolio includes a balance of internationally renowned senior scientists and a significant fraction of early- to mid-career scientists with similarly promising career trajectories.

3. The COV commends the practice of encouraging submission of white papers by university PIs, with feedback by the Program Managers, to help screen proposal submissions to those within the programmatic scope and provide guidance on how scientists can improve their full proposal prior to submission. While this process is effective, additional tracking of the whitepapers is encouraged. This process could benefit from better documentation concerning success statistics and PI demographics.

4. This COV is honored to be the first to employ the PAMS COV module. Navigating PAMS proved to be more challenging than anticipated. The lessons learned from our experience will undoubtedly benefit future COVs within BES.

6. Major Recommendations of the COV

1. The COV strongly recommends providing the opportunity and resources for Program Officers to travel to national and international conferences, as well as to visit the laboratories of researchers in their programs. Attending conferences is critical for PMs to maintain cutting edge portfolios and identify emerging research opportunities. Visiting the laboratories of principal investigators allows the Program Managers to maintain closer contact with these

researchers and to discuss new research directions within their programs. Overall, increased travel will broaden participation in the BES programs and ensure that the research remains at the scientific frontier.

2. Implementation of the PAMS system is laudable. Nonetheless, additional modules and improvements will be beneficial. Additional functionality is needed to facilitate analysis of demographic data. Such data are critical for determining how the reviewing process could be improved and the diversity of the investigator pool could be broadened. The National Laboratory module needs to be developed and deployed to facilitate efficient and effective review of laboratory programs. Attention needs to be paid to the ease of use for people who are new to the system, e.g., members of a COV.

3. The COV commends CSGB's initial implementation of strategic planning and encourages broadening the scope to identify synergies and new research opportunities among various CSGB teams and with other BES divisions.

7. Other Comments and Suggestions of the COV

1. With the excellent descriptions of funding decisions already generated by the PMs, we encourage the program managers to consider ways in which some of this information could be extracted from these documents, and transmitted to the PI in writing as well as over the phone. This is particularly important for proposals that are being declined or terminated.

2. With the blurring of the boundaries between different areas of research and the importance of multidisciplinary and interdisciplinary science, the COV suggests occasional cross-team PI meetings between various programs within BES.

3. The COV greatly appreciated having documents that describe the professional stature of PIs in each program under the CSGB Division. These are exceptionally useful in marketing and promoting the programs appropriately (and impressively!). We suggest that the structure and content of these documents become uniform across the programs in the future.

4. At present the email response to whitepapers simply indicates whether a full proposal is encouraged or discouraged, but without explanation. In order to provide more feedback to the PI, without significantly increasing the burden on the PMs, a checkbox system could be implemented. For example, checkboxes might include: unresponsive to the solicitation topic; outside the programmatic scope; lacks innovation relative to previously funded components of the program; etc.

Appendix I: Charge from the Chair of BESAC, Prof. John Hemminger to the Chair of the COV, Dr. Bruce Kay

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JOHN C. HEMMINGER
UC IRVINE DISTINGUISHED PROFESSOR OF CHEMISTRY
DEPARTMENT OF CHEMISTRY

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November 23, 2016

Dr. Bruce Kay
Physical Sciences Division
Pacific Northwest National Laboratory
P.O. Box 999, K8-88
Richland, WA 99352

Dear Dr. Kay:

The Basic Energy Sciences Advisory Committee (BESAC) has been charged by the Department of Energy Office of Science to assemble a Committee of Visitors (COV) to review the management processes for the Chemical Sciences, Geosciences, and Biosciences Division of the Basic Energy Sciences (BES) program. Thank you for agreeing to chair this BESAC COV panel. Under your leadership, the panel should provide an assessment of the processes used to solicit, review, recommend, and document proposal actions and monitor active projects and programs.

The panel should assess the operations of the Division's program elements during the fiscal years 2014, 2015, and 2016. The panel may examine any files from this period for both DOE laboratory projects and university projects. The Division elements that the COV is being asked to review are:

(1) Atomic, Molecular, and Optical Sciences
(2) Gas Phase Chemical Physics
(3) Condensed Phase and Interfacial Molecular Science
(4) Computational and Theoretical Chemistry
(5) Catalysis Science
(6) Separations and Analysis
(7) Heavy Element Chemistry
(8) Geosciences Research
(9) Solar Photochemistry
(10) Photosynthetic Systems
(11) Physical Biosciences

You will be provided with background material on these program elements prior to the meeting.

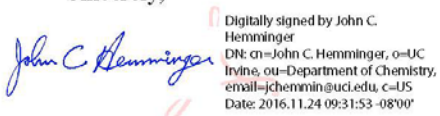
The COV is scheduled to take place March 27 – March 29, 2017 at the BES/DOE Germantown location at 19901 Germantown Road, Germantown, Maryland 20874-1290. A presentation to BESAC is requested at its summer 2017 meeting (as yet unscheduled). Following acceptance of the report by the full BESAC committee, the COV report with findings and recommendations will be presented to the Director of the Office of Science.

I would like the panel to consider and provide evaluation of the following four major elements:

1. For both the DOE laboratory projects and the university projects, assess the efficacy and quality of the processes used to:
   (a) solicit, review, recommend, and document proposal actions and
   (b) monitor active projects and programs.
2. Within the boundaries defined by DOE missions and available funding, comment on how the award process has affected:
   (a) the breadth and depth of portfolio elements, and
   (b) the national and international standing of the portfolio elements.

If you have any questions regarding BESAC or its legalities, please contact Katie Runkles, Office of Basic Energy Sciences at 301-903-6529 or by e-mail at katie.runkles@science.doe.gov. Diane Marceau, the Program Analyst for the Chemical Sciences, Geosciences, and Biosciences Division, will provide logistical support for the COV meeting. She may be contacted by phone at 301-903-0235 or by e-mail at diane.marceau@science.doe.gov. For questions related to the Chemical Sciences, Geosciences, and Biosciences Division, please contact Director Bruce Garrett, 301-903-8165, or by e-mail at bruce.garrett@science.doe.gov. Also, if I can be of any help with the process, please feel free to contact me, 949-824-6020 or by email at jchemmin@uci.edu.

Sincerely,



John C. Hemminger, Chair
Basic Energy Sciences Advisory Committee

cc: H. Kung
B. Garrett
K. Runkles
D. Marceau

Appendix II: COV Members and Contact Information

Last Name	First Name	Institution	Email
Berman	Mike	AFOSR	Michael.Berman@us.af.mil
Blankenship**	Bob	Washington U	blankenship@wustl.edu
Britt	David	UC Davis	rdbritt@ucdavis.edu
Chen	Donna	U South Carolina	dachen@sc.edu
Douberly	Gary	Georgia	douberly@uga.edu
Gaffney	Kelly	SLAC	kgaffney@SLAC.Stanford.EDU
Goldfield	Evi	NSF	egoldfie@nsf.gov
Gunner	Marilyn	CUNY	mgunner@ccny.cuny.edu
Hochella**	Mike	Virginia Tech	hochella@vt.edu
Kay*	Bruce	PNNL	bruce.kay@pnnl.gov
Krummel	Amber	Colorado State	amber.krummel@colostate.edu
McCoy**	Anne	Washington	abmccoy@uw.edu
McGrail	Pete	PNNL	pete.mcgrail@pnnl.gov
Ogilvie	Jennifer	Michigan	jogilvie@umich.edu
Pyrak-Nolte	Laura	Purdue	ljpn@physics.purdue.edu
Soderholm	Lynda	ANL	LS@anl.gov
Stair	Peter	Northwestern	pstair@northwestern.edu
Zoski	Cyndi	New Mexico State	czoski@nmsu.edu

* COV Chair

** Panel Lead

Appendix III: COV Panel Assignments

First Read Panel

Last Name	First Name	Institution	Role	Primary Program Focus
Kay	Bruce	PNNL	COV Chair	
Panel 1: Fundamental Interactions Team				
McCoy	Anne	University of Washington	Panel Chair	
Krummel	Amber	Colorado State U	Subject Matter Expert	CPIMS
Berman	Mike	AFOSR	Subject Matter Expert	General
Douberly	Gary	University of Georgia	Subject Matter Expert	Gas Phase Chem Phys
Gaffney	Kelly	SLAC	Subject Matter Expert	AMO Science
Goldfield	Evelyn	NSF	Subject Matter Expert	Comp/Theoretical Chem
Panel 2: Photochemistry and Biochemistry Team				
Blankenship	Robert	Washington U St Louis	Panel Chair	
Britt	David	UC Davis	Subject Matter Expert	Photosynthetic Systems
Gunner	Marilyn	City College U NY	Subject Matter Expert	General
Ogilvie	Jennifer	University of Michigan	Subject Matter Expert	Physical Biosciences
Zoski	Cyndi	New Mexico State U	Subject Matter Expert	Solar Photochemistry
Panel 3: Chemical Transformations Team				
Hochella	Mike	Virginia Tech	Panel Chair	
Chen	Donna	U South Carolina	Subject Matter Expert	Catalysis Science
McGrail	Pete	PNNL	Subject Matter Expert	Separations and Analysis
Pyrak Nolte	Laura	Purdue	Subject Matter Expert	Geosciences
Soderholm	Lynda	ANL	Subject Matter Expert	Heavy Element Chemistry
Stair	Peter	Northwestern	Subject Matter Expert	General

Second Read Panel

Last Name	First Name	Institution	Role
Kay	Bruce	PNNL	COV Chair
Panel 1: Fundamental Interactions Team			
McCoy	Anne	University of Washington	Panel Chair
Britt	David	UC Davis	Subject Matter Expert
Gunner	Marilyn	City College U NY	Subject Matter Expert
Ogilvie	Jennifer	University of Michigan	Subject Matter Expert
Zoski	Cyndi	New Mexico State U	Subject Matter Expert
Panel 2: Photochemistry and Biochemistry Team			
Blankenship	Robert	Washington U St Louis	Panel Chair
Chen	Donna	U South Carolina	Subject Matter Expert
McGrail	Pete	PNNL	Subject Matter Expert
Pyrak Nolte	Laura	Purdue	Subject Matter Expert
Soderholm	Lynda	ANL	Subject Matter Expert
Stair	Peter	Northwestern	Subject Matter Expert
Panel 3: Chemical Transformations Team			
Hochella	Mike	Virginia Tech	Panel Chair
Krummel	Amber	Colorado State U	Subject Matter Expert
Berman	Mike	AFOSR	Subject Matter Expert
Douberly	Gary	University of Georgia	Subject Matter Expert
Gaffney	Kelly	SLAC	Subject Matter Expert
Goldfield	Evelyn	NSF	Subject Matter Expert

Appendix IV: COV Agenda

AGENDA
Basic Energy Sciences Advisory Committee
Committee of Visitors for the
Chemical Sciences, Geosciences, and Biosciences Division
March 28-30, 2017
Rockville Hilton

Monday, March 27, 2017				
Time	**Activity**	**Committee Members**	**BES Staff**	**Location**
6:30 PM	Optional, Informal Reception	All	All – Optional	Hotel lobby

Tuesday, March 28, 2017				
Time	**Activity**	**Committee Members**	**BES Staff**	**Location**
8:00 AM	Continental Breakfast Available	All		Outside Montgomery
8:30 AM	Welcome and Charge to the Committee	All	John Hemminger, Chair Basic Energy Sciences Advisory Committee	Montgomery
8:40 AM	Overview of Basic Energy Sciences	All	Harriet Kung, Director Office of Basic Energy Sciences	Montgomery
9:00 AM	Overview of the Chemical Sciences, Geosciences, and Biosciences Division	All	Bruce Garrett, Director Chemical Sciences, Geosciences, and Biosciences Division	Montgomery
9:30 AM	Review Process	All	Gail McLean, Team Lead	Montgomery
9:50 AM	Description of the SC Portfolio Analysis and Management System (PAMS) COV module	All	Jeff Krause, Team Lead	Montgomery
10:15 AM	Instructions and Schedule	All	Bruce Kay, COV Chair	Montgomery
10:30 AM	Break and disperse to panel rooms			
10:45 AM	**First Read Panel 1** Fundamental Interactions Team	Panel 1 Members	Jeff Krause, Team Lead Greg Fiechtner, Tom Settersten, Wade Sisk, Mark Pederson	Twinbrook
10:45 AM	**First Read Panel 2** Photochemistry and Biochemistry Team	Panel 2 Members	Gail McLean, Team Lead Chris Fecko, Stephen Herbert, Mark Spitler, Bob Stack	Democracy

10:45 AM	**First Read Panel 3** Chemical Transformations Team	Panel 3 Members	Raul Miranda, Team Lead Chris Bradley, Chuck Peden (IPA), Jim Rustad, Viviane Schwartz, Philip Wilk	Frederick
12:30 PM	Lunch	All		Outside Montgomery
1:30 PM	Resume First Read Panels	Panels		Panel Rooms
4:00 PM	Preliminary Report Drafting – Key Elements and Gaps	Panels		Panel Rooms
5:00 PM	Meeting between Panel Leads and Chair	Panel Leads and Chair		Montgomery
5:30 PM	Meeting with Chair and BES Senior Management	Chair	Harriet Kung, Bruce Garrett	Montgomery
6:30 PM	Dinner for COV and BES Staff	All	All	Hotel location TBD

Wednesday, March 29, 2017				
Time	**Activity**	**Committee Members**	**BES Staff**	**Location**
8:00 AM	Continental Breakfast Available	All		Outside Montgomery
8:30 AM	Fundamental Interactions Team	Panel 1 Members	Jeff Krause, Team Lead Greg Fiechtner, Tom Settersten, Wade Sisk, Mark Pederson	Twinbrook
8:30 AM	Photochemistry and Biochemistry Team	Panel 2 Members	Gail McLean, Team Lead Chris Fecko, Stephen Herbert, Mark Spitler, Bob Stack	Democracy
8:30 AM	Chemical Transformations Team	Panel 3 Members	Raul Miranda, Team Lead Chris Bradley, Chuck Peden (IPA), Jim Rustad, Viviane Schwartz, Philip Wilk	Frederick
9:15 AM	Complete First Read Panel Reports	Panels		Panel Rooms
11:15 AM	COV Executive Session Reports from Panel Leads on First Read Reports	All		Montgomery
12:30 PM	Lunch	All		Outside Montgomery
1:30 PM	**Second Read Panel 1** Fundamental Interactions Team	Panel 1 Second Read Members	Jeff Krause, Team Lead Greg Fiechtner, Tom Settersten, Wade Sisk, Mark Pederson	Twinbrook

1:30 PM	**Second Read Panel 2** Photochemistry and Biochemistry	Panel 2 Second Read Members	Gail McLean, Team Lead Chris Fecko, Stephen Herbert, Mark Spitler, Bob Stack	Democracy
1:30 PM	**Second Read Panel 3** Chemical Transformations	Panel 3 Second Read Members	Raul Miranda, Team Lead Chris Bradley, Chuck Peden (IPA), Jim Rustad, Viviane Schwartz, Philip Wilk	Frederick
3:30 PM	COV Executive Sessions Merge First and Second Read Input Draft Panel Reports	First Read Panels		Panel Rooms
4:00 PM	COV Executive Session	All		Montgomery
5:30 PM	Break	All		
	Dinner on your own	All		Local restaurant information provided

Thursday, March 30, 2014				
Time	**Activity**	**Committee Members**	**BES Staff**	**Location**
8:00 AM	Continental Breakfast Available	All		
8:30 AM	COV Executive Session Finalize Draft Panel Reports	All		Montgomery
10:00 AM	Closeout Session with COV and BES Senior Management and Staff	All	All	Montgomery
11:00 AM	End of meeting	All		Montgomery

The Montrose Room will be available for CSGB federal employees to use during the COV.

Appendix V: Checklists for COV review

Checklist for COV Review -- CSGB Grant Award Process	
	Comments
I. Efficacy and Quality of Processes **(a) Solicit, review, recommend and document proposal actions** **(b) Monitor active projects and programs**	
Review Process: Consider, for example:	
Sufficient number of reviews? Qualified reviewers? Quality of reviews (consistent with criteria)?	
Documentation and Monitoring: Consider, for example:	
Completeness of selection statement? Revised budgets? Content of declination summary? Continuation/Annual reports?	
II. Impact and Standing of Portfolio Elements **(a) Award breadth and quality: Consider, for example:**	
Potential and/or actual impact evident? Balance of innovation and risk? Technical diversity?	
Complement the CRA's research portfolio? Relevant to the DOE's mission?	
Size and duration of award?	
III. Impact and Standing of Portfolio Elements **(b) National and International Standing.** Consider, for example:	
PIs national/international leaders in their fields?	

Checklist for COV Review -- CSGB National Laboratory Award Process	
	Comments
I. Efficacy and Quality of Processes **(a) Solicit, review, recommend and document proposal actions** **(b) Monitor active projects and programs**	
Review Process: Consider, for example:	
Sufficient number of reviews? Qualified reviewers? Quality of reviews (consistent with criteria)? Adequacy of on-site review process?	
Documentation and Monitoring: Consider, for example:	
Completeness of review summary? Appropriateness/clarity of Guidance Letter and Action Items? Adequacy of laboratory response to Action Items (if appropriate)? Synergistic effort appropriate for National Laboratory program?	
II. Impact and Standing of Portfolio ELements **(a) Award breadth and quality: Consider, for example:**	
Potential and/or actual impact evident? Balance of innovation and risk? Technical diversity?	
Complement the CRA's research portfolio? Relevant to the DOE's mission?	
Size and duration of award?	
III. Impact and Standing of Portfolio Elements **(b) National and International Standing.** Consider, for example:	
PIs national/international leaders in their fields?	

Appendix VI: First Read/Second Read COV Report Template

PANEL REPORT TEMPLATE

BES COMMITTEE OF VISITORS (COV)
Reviewing the Chemical Sciences, Geosciences and Biosciences Division

Based on the Charge to the COV:

1) For both the DOE laboratory projects and the university projects, assess the efficacy and quality of the processes used to:
(a) solicit, review, recommend, and document proposal actions and
(b) monitor active projects and programs.

(2) Within the boundaries defined by DOE missions and available funding, comment on how the award process has affected:
(a) the breadth and depth of portfolio elements, and
(b) the national and international standing of the portfolio elements.

I. Efficacy and Quality of the Program's Processes

Based on the COV's study of proposal actions completed within the past three fiscal years, please provide brief findings, recommendations, and comments on the following aspects of the program's processes and management used to:

(a) Solicit, review, recommend, and document proposal actions
Consider, for example:

- consistency with priorities and criteria stated in the program's solicitations, announcements, and guidelines
- adequate number of reviewers for balanced review; use of reviewers having appropriate expertise/qualifications; use of a sufficiently broad pool of reviewers; avoidance of conflicts of interest
- efficiency/time to decision
- completeness of documentation making recommendations

Findings:

Comments:

Recommendations:

(b) Monitor active projects and programs

Consider, for example

- written progress reports
- PI meetings
- site visits
- effective interactions between program managers and PIs

Findings:

Comments:

Recommendations:

II. Effect of the Award Process on Portfolios

Taking into account the DOE, BES, and Division missions, the available funding, and information presented about the portfolio of funded science, comment on how the award process has affected:

(a) The breadth and depth of portfolio elements

Consider, for example:

- the overall quality of the science
- the balance of projects with respect to innovation, risk, and interdisciplinary research
- the evolution of the portfolio with respect to new investigators and new science thrusts
- the relationship of the portfolio to other parts of the Division
- the appropriateness of award scope, size, and duration

Findings:

Comments:

Recommendations:

(b) The national and international standing of the portfolio elements

Consider, for example:

- the uniqueness, significance, and scientific progress and impact
- the stature of the principal investigators in their fields
- the leadership position in the nation and the world

Findings:

Comments:

Recommendations:

Appendix VII: Summary Reports from the Three Panels

Panel 1. Fundamental Interactions
Panel 2. Photochemistry and Biochemistry
Panel 3. Chemical Transformations

Panel 1. FUNDAMENTAL INTERACTIONS

BES COMMITTEE OF VISITORS (COV)
Reviewing the Chemical Sciences, Geosciences and Biosciences Division

Based on the Charge to the COV:

1) For both the DOE laboratory projects and the university projects, assess the efficacy and quality of the processes used to:

(a) solicit, review, recommend, and document proposal actions and
(b) monitor active projects and programs.

(2) Within the boundaries defined by DOE missions and available funding, comment on how the award process has affected:

(a) the breadth and depth of portfolio elements, and
(b) the national and international standing of the portfolio elements.

I. Efficacy and Quality of the Program's Processes

Based on the COV's study of proposal actions completed within the past three fiscal years, please provide brief findings, recommendations, and comments on the following aspects of the program's processes and management used to:

(a) Solicit, review, recommend, and document proposal actions

Consider, for example:

- consistency with priorities and criteria stated in the program's solicitations, announcements, and guidelines
- adequate number of reviewers for balanced review; use of reviewers having appropriate expertise/qualifications; use of a sufficiently broad pool of reviewers; avoidance of conflicts of interest
- efficiency/time to decision
- completeness of documentation making recommendations

Findings:

The Fundamental Interactions Team of CSGB contains four core programs: Atomic, Molecular and Optical Sciences (AMOS); Gas-Phase Chemical Physics (GPCP); Condensed Phase and Interfacial Molecular Sciences (CPIMS) and Computational and Theoretical Chemistry (CTC). All four programs have strong university and laboratory components and, with the exception of CTC, they support both experimental and theoretical/computational work.

The program managers are uniformly doing an excellent job of soliciting an excellent array of proposals, and providing substantive and professional reviews. The proposals we looked at were each reviewed by 3-6 reviewers. While there is always variability in the thoroughness of the reviewers' comments, the vast majority of the reviewers provided substantive assessments of the project, its fit with the program, experience of the PI and budget considerations. Even when the reviews were highly positive, many reviews

provided appropriate constructive suggestions to the PI. The chosen reviewers were appropriate for the projects they were assessing. In the case of multi-PI and laboratory proposals, the assessment was more thorough, appropriate for the size of the project.

With the flat budgets and the need to forward fund projects, funding has been tight during the three years under review, and several long-term PIs were not renewed or were given a shorter duration "terminal renewal." These as well as the positive funding decisions were well-documented by the PM and the rationale for the decisions was easy to trace even in cases where the reviews were generally positive, but where the PMs identified a longer-term concern that resulted in decisions not to fund the proposed work. Such concerns included alignment with direction of program; recent productivity; critical mass of research area in the program.

Comments:

Much of the interaction between the PM and the PIs occurs by phone, and PMs have extended phone conversations with PIs in discussion of white papers as well as funding decisions, both positive and negative. This has allowed for considerable exchange of information. On the other hand such conversations can be challenged by the human factor that what is said and what is received is not always fully aligned. With the excellent descriptions of funding decisions already generated by the PMs, we encourage the PMs to consider extracting some of this information from these documents, and sharing it with the PI in writing as well as over the phone. This is particularly important for proposals that are being declined or sunsetted.

We are pleased to be the first COV to use the PAMS system, and there are clear advantages to having everything integrated into an electronic format. Those who had reviewed proposals using the system commented that it worked well. On the other hand, as a COV, we found that some of the information we needed, particularly the PMs comments on the funding decision, were not in a single standard location. It would be helpful to the COV if an option were available to pull out the information most relevant to the COV into a single file or folder, or if the members of the COV were provided written "cheat sheets" to help them navigate the system.

At a time when it is becoming increasingly important for PMs and senior staff to be able to justify expenditures, statistics on demographics, stage of career, institution types, etc. that are readily accessible and easily obtained are absolutely critical. So far, much of the data collection capabilities promised by the PAMS system have not been fully realized. We understand that there is significant financial cost for each new feature implemented in PAMS so we hope these enhancements can be performed in a cost-effective and prioritized way.

We appreciated the distribution of proposals that the COV was provided, although for future COV's it would be useful if some of the proposals provided to the group were picked at random in addition to others that were chosen by the PMs.

Recommendations:

Continue to work on the development of the PAMS system, particularly the statistical data mining capabilities, development of the lab module and ease of use for people who are new to the system.

b) Monitor active project and programs

Consider, for example

- written progress reports
- PI meetings
- site visits
- effective interactions between program managers and PIs

Findings:

The progress reports we were able to find were thorough, but they were difficult to find in PAMS and with the recent transition of this reporting function to PAMS only a few were available.

The PI meetings provide an important component of the PMs efforts to keep the mission focus of the program and for identifying synergies among PIs and encouraging collaborations. The PMs take good advantage of these meetings in moving these activities forward and in involving the PIs in discussions of longer-term directions for the programs. Separate meetings are run for each of the programs and some PIs whose work cuts across several of the programs are provided the opportunity to alternate between several contractors' meetings or attend more than one a year.

The panel commends the program managers in doing a very nice job with highlights.

COV members who have put together progress reports in PAMS find that the way products get inserted into PAMS is clunky.

Reports from site visits are very comprehensive, consistent with the size of the programs, and thorough. When a multi-investigator (>10) on-going project was not continued, good feedback was provided to the PIs.

Comments:

It is critical that the PMs are able to participate in national conferences. These meetings allow the PMs to identify emerging areas of research and Investigators who may be doing excellent work that is relevant to their programs, who are not on their radar. Mechanisms need to be found to facilitate such participation through increased or reallocated travel budgets.

Recommendations:

The primary recommendation is that travel budgets be reassessed and ideally increased to allow PMs to participate in scientific meetings that are relevant to their programs and to visit the groups in national laboratories that are supported by their programs.

II. Effect of the Award Process on Portfolios

Taking into account the DOE, BES, and Division missions, the available funding, and information presented about the portfolio of funded science, comment on how the award process has affected:

(a) The breadth and depth of portfolio elements

Consider, for example:

- the overall quality of the science
- the balance of projects with respect to innovation, risk, and interdisciplinary research
- the evolution of the portfolio with respect to new investigators and new science thrusts
- the relationship of the portfolio to other parts of the Division
- the appropriateness of award scope, size, and duration

Findings:

The program managers are doing an excellent job in actively managing their portfolios. As three of the programs in the Fundamental Interactions group were, until recently, a single program (CPIMS, CTC and GPCP) long-term synergies between the PMs and their PIs already exist.

The AMOS program is an interesting one as over the years it has focused on ultrafast science – recognizing that there are other agencies that already fund other aspects of AMO physics. This approach also allows the program to capitalize on the unique capabilities of the DOE facilities in the research that is being supported, and to focus on work that most directly supports the DOE mission.

The program managers actively manage their programs through their interactions with potential PIs through white papers, and in identifying synergies in the expertise of several PIs to develop teams that can pursue science that is impactful and important to the program's mission.

All of this points to the fact that the PMs are involved in proactive portfolio management with evidence that the PMs know the portfolio well and have a well-articulated vision of the trajectory it is taking.

Overall the quality of the science that is supported by the Fundamental Interactions group is excellent as is evidenced by the high quality of many of the proposals and PIs that were not recommended for funding.

While the long-range planning and synergies within the programs and between the programs in the fundamental interactions group is excellent, with funding challenges it seems that higher level coordination is not as far along, particularly with ASCR and with materials science and engineering.

Comments:

Many of the most important scientific challenges that face us require interdisciplinary and multi-disciplinary approaches. Some of the most impactful research projects are spanning multiple traditional disciplines of science and engineering, for example between material science and chemistry. With the blurring of the boundaries between different areas of research and the importance of multidisciplinary and interdisciplinary science, the PMs should balance the possible impacts of inserting artificial delineations between areas of science based on the scope of their individual programs with the importance of having PI meetings focused on a well-defined mission of the program. We encourage cross program communication and interaction – for example occasional PI team meetings or team meetings with other programs within BES.

Recommendations:

Move toward extending the strategic planning that has been occurring within the program and group to include other CSGB teams and other BES divisions.

(b) The national and international standing of the portfolio elements

Consider, for example:

- the uniqueness, significance, and scientific progress and impact
- the stature of the principal investigators in their fields
- the leadership position in the nation and the world

Findings:

The programs support an impressively strong group of PIs at various career stages. There is an impressive group of younger faculty, with several of the younger faculty receiving Sloan and other early career awards. Senior faculty have received a variety of prestigious awards and recognition including election to the NAS and ACS national awards.

The PIs are also active in the community as editors of the top journals in chemical physics, physical chemistry and AMO physics. They are also actively engaged in conference organization.

All programs described high-impact outcomes of funded work.

Comments:

The PMs should be proud of the excellent group of PIs they have assembled into their programs. In particular the composition of the CTC program, with the significant number of early to mid-career investigators, could serve as a model for other programs in BES CSBG.

Recommendations: None.

Panel 2. PHOTOCHEMISTRY AND BIOCHEMISTRY

BES COMMITTEE OF VISITORS (COV)
Reviewing the Chemical Sciences, Geosciences and Biosciences Division

Based on the Charge to the COV:

1) For both the DOE laboratory projects and the university projects, assess the efficacy and quality of the processes used to:

(a) solicit, review, recommend, and document proposal actions and
(b) monitor active projects and programs.

(2) Within the boundaries defined by DOE missions and available funding, comment on how the award process has affected:

(a) the breadth and depth of portfolio elements, and
(b) the national and international standing of the portfolio elements.

I. Efficacy and Quality of the Program's Processes

Based on the COV's study of proposal actions completed within the past three fiscal years, please provide brief findings, recommendations, and comments on the following aspects of the program's processes and management used to:

(a) Solicit, review, recommend, and document proposal actions

Consider, for example:

- consistency with priorities and criteria stated in the program's solicitations, announcements, and guidelines
- adequate number of reviewers for balanced review; use of reviewers having appropriate expertise/qualifications; use of a sufficiently broad pool of reviewers; avoidance of conflicts of interest
- efficiency/time to decision
- completeness of documentation making recommendation

Findings:

Three main programs comprise the Photochemistry and Photobiology portion of CSGB: Solar Photochemistry, Photosynthetic Systems, and Physical Biosciences. Together, these represent a program integrating projects from Biology, Chemistry, and Physics. All three programs fund a combination of research at universities and national laboratories. The three programs have strong synergy in meeting the goal of understanding light energy capture and conversion into chemical and electrical energy through biological and chemical pathways. This goal is critical to the DOE mission. The presence of these programs within CSGB serves a particular function to inform the more physically oriented divisions of examples of how biology carries out certain difficult chemical processes such as nitrogen fixation and light-energy capture and storage. These mechanisms may provide a blueprint for how to accomplish these processes in artificial systems.

The COV found the proposal review process to be excellent. The expertise of the chosen reviewers was highly appropriate, with at least three, and usually more substantive reviews obtained for each proposal. The time to decision was found to be very reasonable. The funding decisions made by the Program Managers were well supported by the reviews and consistent with the program mission. It was clear to the COV that great care is taken in this process and this is reflected in the selection/declination statements written by the Program Managers. This deep engagement of the Program Managers in shaping their respective programs in a way that strikes an important balance between mission focus and flexibility in pursuing fundamental research is the foundation of their successful, far reaching programs.

The Photosynthetic Systems, and Physical Biosciences programs make use of a panel review. This restricts the time of submission to be several months before the panel, while having the advantage of reviewers being able to rank proposals relative to each other.

The COV did not have a good understanding of how the pre-proposal (i.e., white paper) process works and how they are evaluated. More transparency in this process would be helpful in facilitating the entrance of more junior scientists into the system.

Comments: None.

Recommendations:

The COV recommends that the pre-proposal process be more fully documented. Statistics on the pre-proposal pool and those that are selected could provide valuable information regarding the success rate at the full proposal stage. The COV acknowledges that while demographic data could provide information regarding diversity at the pre-proposal stage, its value may be limited due to the voluntary reporting of such characteristics by the PIs and reviewers.

(b) Monitor active project and programs

Consider, for example

- written progress reports
- PI meetings
- site visits
- effective interactions between program managers and PIs

Findings:

The written progress reports are a useful tool for Program Managers to monitor PI progress. The COV learned that there is not uniform acknowledgement of the program funding the research in publications and that the laboratories are not consistently required to provide written progress reports.

The PI meetings are very useful events that help in building a sense of scientific community. They are a valuable mechanism and should be continued. This is another key strength of the DOE program.

The multifaceted interactions between Program Managers and PIs are highly effective. The Program Managers provide important and regular feedback to PIs on the mission-driven relevance of their research, and in turn are open to input from their PIs to shape their programs.

Solar Photochemistry uses a year-round submission with each proposal being reviewed more independently. The different methods of review lead to programs that are doing an excellent job of identifying excellent projects consistent with their mission.

The Program Managers have been doing an excellent job of recruiting top young and mid-career PIs.

Comments:

The COV noted that the Program Managers are active and very effective at determining when projects are unproductive or drifting outside of the program mission. Under these difficult circumstances, the Program Managers take great care to clearly communicate their concerns and expectations to the PIs. The one year of funding provided to terminated projects was viewed favorably by the COV.

Exceptional research is being carried out by program PIs in both university and laboratory settings. The COV was surprised to learn about the trend towards increased support of laboratory projects, which in times of flat budgets, comes at the expense of university research. There was concern among COV members that this could ultimately have a negative impact on workforce development and competitiveness of the nation.

Recommendations:

The COV suggests that a mechanism to increase the effectiveness of the PI meetings could be to invite as guests a few younger investigators or individuals engaged in cutting edge research who are not in the program and who are not yet funded. These researchers could be nominated by existing PIs and this could serve as another mechanism for bringing exceptional researchers into the program. Cross-fertilization between PI meetings already takes place and could be further encouraged. Larger involvement of EFRC and hub centers at the PI meetings could also be instrumental in encouraging and facilitating the development of additional collaborations.

The COV also recommends that lab-based projects submit yearly progress reports in the same manner as the university-based projects. These reports should include a list of publications and significant findings. All publications should include more detailed acknowledgments of the program that funded the research.

II. Effect of the Award Process on Portfolios

Taking into account the DOE, BES, and Division missions, the available funding, and information presented about the portfolio of funded science, comment on how the award process has affected:

(a) The breadth and depth of portfolio elements

Consider, for example:

- the overall quality of the science
- the balance of projects with respect to innovation, risk, and interdisciplinary research
- the evolution of the portfolio with respect to new investigators and new science thrusts
- the relationship of the portfolio to other parts of the Division
- the appropriateness of award scope, size, and duration

Findings:

The COV found the quality of the research to be exceptional across all three programs. The portfolios are well balanced with respect to research area, innovation and risk, although the way the information was organized for the COV in PAMS made this difficult to analyze in detail. The programs are clearly differentiated and have good synergy. The Program Managers work effectively to continually evaluate the focus of their own programs to encompass the most exciting and mission-relevant science. As the Program Managers reshape the research priorities and directions of their programs, it is important to ensure that subtle changes in mission are clearly communicated to the PI community and beyond. The program managers accomplish this through carefully crafted mission statements, one-on-one discussions, and portfolio presentations at the PI meetings. The Program Managers work well together and there is also evidence of good collaboration with other parts of the Division.

The COV agreed unanimously that the Program Managers are doing an excellent job of maintaining vibrant programs within the limitations associated with their budgets. Given these budgetary constraints, the awards are appropriate in size, scope and duration. The COV commends the Program Managers on their success in sustaining their programs through the challenging process of pre-proposal to a successfully funded full proposal.

Comments: None.

Recommendations:

The COV struggled to access the information contained within PAMS. It would be very helpful for the COV if a folder was created within PAMS for each proposal that contains the relevant information in a more accessible manner. Items that should be included in

this folder include reviews, selection memos, original and revised budgets, and progress reports, for example.

The COV strongly recommends increasing the travel funds for Program Managers. Travel to conferences is essential for the Program Managers to ensure that their programs remain at the cutting edge of science.

(b) The national and international standing of the portfolio elements

Consider, for example:

- the uniqueness, significance, and scientific progress and impact
- the stature of the principal investigators in their fields
- the leadership position in the nation and the world

Findings:

The research in these three programs fills an important niche relevant to DOE's mission that is distinct from research programs funded by other agencies. The integration of questions and methodology from Biology, Chemistry, and Physics to understand solar energy capture, conversion, and storage in photosynthetic systems allows for highly novel and synergistic science to be funded by DOE.

The program PIs are very well respected both nationally and internationally. They include distinguished fellows and winners of the top prizes in science, including two Nobel Prize winners. They hold key leadership positions as editors of top journals and organizers of the most important national and international conferences in the field.

Comments: None

Recommendations: None

Panel 3. CHEMICAL TRANSFORMATIONS

BES COMMITTEE OF VISITORS (COV)
Reviewing the Chemical Sciences, Geosciences and Biosciences Division

Based on the Charge to the COV:

1) For both the DOE laboratory projects and the university projects, assess the efficacy and quality of the processes used to:

(a) solicit, review, recommend, and document proposal actions and
(b) monitor active projects and programs.

(2) Within the boundaries defined by DOE missions and available funding, comment on how the award process has affected:

(a) the breadth and depth of portfolio elements, and
(b) the national and international standing of the portfolio elements.

I. Efficacy and Quality of the Program's Processes

Based on the COV's study of proposal actions completed within the past three fiscal years, please provide brief findings, recommendations, and comments on the following aspects of the program's processes and management used to:

(a) Solicit, review, recommend, and document proposal actions

Consider, for example:

- consistency with priorities and criteria stated in the program's solicitations, announcements, and guidelines
- adequate number of reviewers for balanced review; use of reviewers having appropriate expertise/qualifications; use of a sufficiently broad pool of reviewers; avoidance of conflicts of interest
- efficiency/time to decision
- completeness of documentation making recommendations

Findings:

After looking through many, many dozens of cases made available to us in the PAMS system, in nearly all cases, the PMs seem to be doing everything very well. The numbers and quality of reviewers, and the reviews that are generated, are generally excellent/well done. All this is guiding comprehensive and insightful funding decisions, with PMs justifying why funding was or was not recommended, and informing PIs of the results. We saw only a few cases where there seemed to be inconsistencies, such as, for example, when the PM made a decision based on two positive reviews, and one quite negative one. In this case, the PM professionally discounted the negative review, and funded the project. In another case, the PM received 4 reviews, 3 positive but very general in their comments, and one negative that was very specific. The proposal was funded, but the PM did not specifically address the negative review in writing their decision. Again, although cases like this stood out, they were not common.

Comments:

We appreciate the fact that highly competent and timely reviewing is a challenge to find, and that there will be cases where a more "robust" reviewer number (4 to 7, the higher number only expected for multiple-PI proposals from national laboratories) may not be available, especially when reviewers promise and then do not deliver, and dozens of proposals are all being reviewed at the same time. We also appreciate the tremendous workload on the PMs.

For those of us on this panel who have reviewed both DOE and NSF funding, we agree that the quality of PMs at DOE, at least within the Chemical Transformation teams, are as high in quality, or higher, than their equivalents at NSF. This takes nothing away from NSF, to be sure, which we feel is equally a "crown jewel" in the national research system. In a sense, DOE PMs have a more difficult task that they are presented with, in that DOE is a mission-oriented agency, and NSF is not (technically speaking). "Missions" are inherently more complex, in that they must stay within highly relevant boundaries that change with time depending on national priorities, and in BES's case, must also mesh with curiosity-driven, totally open-ended research (the latter which is generally the case at NSF).

Recommendations:

Although this panel is critically aware that having many hundreds of complex proposals thoroughly reviewed is difficult, and that making proposal funding decisions are equally difficult, the PMs should always strive to succinctly, but thoroughly, explain why a proposal was accepted or declined in as much detail as possible and practical. Also, as much information as possible needs to be passed back to PIs for both successful and declined proposals. We fully realize that this is every PM's intent. Again, overall, the panel was very pleased with what they saw, and the questioning comments above only come from a small number of cases.

(b) Monitor active project and programs

Consider, for example

- written progress reports
- PI meetings
- site visits
- effective interactions between program managers and PIs

Findings:

The panel found that written progress reports were generally in good order, that PI meetings were occurring at a healthy rate, that site visits were happening at less than an optimal rate (this due to severe restrictions on PM travel funding), but as far as we could tell, there is still effective interactions between PMs and PIs when needed through e-mail

and telephone. That is, PMs are accessible, and PIs are sensitive to this direct line of communication.

Comments:

Different PMs employ different PI meeting frequencies, and different meeting formats, but we found all styles to be in the realm of being perfectly acceptable. In all cases, meeting and communication formats seemed to be a matter of personal style, but none of the methods uses lacked in substance. Clearly, it is just really too bad that PM travel must be minimized due to funding, and we have addressed this in our combined panel report to CSGB.

Recommendations:

Although it does not seem to have made any difference in past years, we suggest that the Office of Science continue to make it known among upper management that travel funding needs to be restored to a more reasonable level. We fully understand that this is unlikely to change anytime in the near future, but it is still important that we keep making this shortcoming known in our reports.

II. Effect of the Award Process on Portfolios

Taking into account the DOE, BES, and Division missions, the available funding, and information presented about the portfolio of funded science, comment on how the award process has affected:

(a) The breadth and depth of portfolio elements

Consider, for example:

- the overall quality of the science
- the balance of projects with respect to innovation, risk, and interdisciplinary research
- the evolution of the portfolio with respect to new investigators and new science thrusts
- the relationship of the portfolio to other parts of the Division
- the appropriateness of award scope, size, and duration

Findings:

The COV judges that the Chemical Transformation team continues to maintain the breadth and depth of the portfolio elements, as well as the stature of the science and funded principal investigators, to be excellent. The Program Managers have successfully balanced the mission-oriented nature of the DOE with the flexibility required for high-quality basic scientific research, clearly the world-class hallmark of BES. For example, the Program Managers have specifically encouraged innovative and unique research directions to broaden the portfolio. They also have strategic, brain-storming sessions and retreats, and compare notes between CSGB programs

with synergies coming out of this. Some PMs are considering having selected joint PI meetings, which we feel is a great idea.

Comments:

PMs have gone out of their way to find new, young to mid-career investigators. This is impressive, and important. Their research portfolios are always being modernized, it seems, and there also seems to be a nice mix of projects that are out on the edge (in terms of risk vs. reward) vs. still high tech, but more "routine" data gathering research which can also be exactly what is needed in a developing field. The panel noticed this, and applauds this diversity.

Recommendations:

Although there is clearly not enough money in these programs to fund many of the excellent proposals being received, we suggest that the PMs continue their excellent work in keeping their program fresh, as diverse as possible within their mission, and as excellent in quality as they have for many years already.

(b) The national and international standing of the portfolio elements

Consider, for example:

- the uniqueness, significance, and scientific progress and impact
- the stature of the principal investigators in their fields
- the leadership position in the nation and the world

Findings:

The research portfolios in Chemical Transformations clearly include a balance of internationally renowned senior scientists and a significant fraction of early- to mid-career scientists with highly promising career trajectories. This seems to be the case at both national laboratories and at universities. The list of scientists involved reads like a Who's Who in their fields, even on an international level. In addition, we all know of outstanding and productive scientists at their age and stage who cannot find funding within BES, and this is simply a function of 1) funding availability, and 2) these Chemical Transformation programs trying to find the groups that most fit their mission and future vision.

Comments:

It was a fantastic idea to generate the "stature documentation" of PIs funded in the Chemical Transformation portfolio. This is greatly appreciated, and it clearly shows the power of this group. Many awards, honors, fellowships, editorships, etc., are apparent throughout the team of researchers, and frankly, this level of achievement is not surprising. Nevertheless, it is "comforting" to document that the level of notoriety and

accolades are what we expected them to be. It also shows that the younger scientists in the Chemical Transformation program are also budding superstars according to the accolades that they have achieved at a relatively young age.

Our panel also wishes to mention that although some groups are continuously funded for a long, long time, renewal after renewal, if that group stops producing at the cutting edge, or moves off the mission line, they will be asked to terminate. We saw several such cases, and applaud these PM decisions. For the groups that do stay on, science is rewarded by the deep understanding of highly talented practitioners, generating rich knowledge that would not have been available had the funding not been continuous for a long period. In these cases, bravo!

Recommendations: None