

**Report  
To  
Basic Energy Sciences Advisory Committee**

**Committee of Visitors  
Materials Science and Engineering Programs  
Office of Basic Energy Sciences  
U.S. Department of Energy**

**May 5, 2003**

## **I. Introduction**

In 2001, the Director of the Office of Science requested that the Basic Energy Sciences Advisory Committee (BESAC) establish a Committee of Visitors (COV) review process for the programs within the Office of Basic Energy Sciences (BES). The stated aim was to provide a process “through which BESAC can provide an assessment on a regular basis of matters pertaining to program decisions. ...The COV should provide an assessment of the processes used to solicit, review, recommend and document proposal actions and monitor active proposals and programs.” The first COV met on January 30-February 1, 2002 at the DOE Germantown facility to evaluate the Chemical Sciences programs contained within the Fundamental Interactions Team and the Molecular Processes and Geosciences Team.

This report is the product of the second BES-COV that met on March 17, 18, 2003, providing an evaluation of the Materials Sciences and Engineering Programs. This was the first COV for these programs. The report is organized into the following sections: the charge to the Committee of Visitors, the composition of the COV, the process that was utilized for the COV, and the conclusions and recommendations of the committee.

## **II. The Charge to the Committee of Visitors**

The Charge to the COV was provided in a letter from Patricia M. Dehmer (Associate Director of the Office of Science, for the Office of Basic Energy Sciences), and Iran L. Thomas (then Director, Division of Materials Sciences & Engineering) to the COV Chair, John C. Hemminger. The charge letter requests that the committee evaluate the components of the Division of Materials Sciences & Engineering that include: Materials Physics; Synthesis, Processing and Engineering Sciences; Neutron and X-ray Scattering; Condensed Matter Physics; and Materials Chemistry. Specifically, the committee was asked to assess, for both the DOE laboratory and the university projects, the efficiency and quality of the processes used to:

- a. Solicit, review, recommend and document proposal actions
- b. Monitor active projects and programs

The committee was also asked to comment on how the award process has affected:

- a. The breadth and depth of portfolio elements
- b. The national and international standing of the portfolio elements

The COV was charged to assess the operations of the above programs during the fiscal years 2000, 2001, and 2002.

### **III. The Committee Membership**

The range of topical areas to be reviewed by the committee necessitated a fairly large committee. Approximately 25 people were chosen to serve on the COV. The primary criterion for the committee membership was the need to provide a balance of expertise that would cover the five diverse programs mentioned in the charge to the committee. It was also deemed desirable that a component of the committee members receive no direct research support from the Department of Energy. Approximately 44% of the members receive no support from the DOE. The committee included members with experience managing research programs, either at DOE or NSF. There was a balance between university principal investigators, and national laboratory investigators (including non-DOE national labs). Additional considerations used to develop a balanced committee included: institution, geographical region, etc. The resulting COV was made up of an outstanding group of internationally recognized researchers, providing broad coverage of the areas of science under review.

John C. Hemminger of the University of California, Irvine chaired the Committee of Visitors. The committee was organized into five sub-panels, each assigned to one of the program areas under review. These sub-panels, and the sub-panel Chairs, are listed below. The sub-panel memberships, including memberships of the “second-read” and “merge” sub-panels are also attached to this report as Appendix 2.

#### Sub-panel 1: Materials Physics

Dr. Julia Phillips, Sandia National Laboratory, Albuquerque—Chair  
Professor Dieter Ast, Cornell University  
Professor John C. Bravman, Stanford University  
Professor Ron Gibala, University of Michigan  
Professor Paul Peercy, University of Wisconsin

#### Sub-panel 1: Synthesis, Processing and Engineering Sciences

Professor Harry Atwater, California Institute of Technology—Chair

Professor Roger French, Dupont and University of Pennsylvania  
Dr. Carol Handwerker, National Institutes for Science and Technology  
Dr. David Johnson, Retired, Bell Laboratories  
Professor Daniel Joseph, University of Minnesota

Sub-panel 3: Neutron and X-ray Scattering

Professor Gordon Brown, Stanford University—Chair  
Professor S. Chen, Massachusetts Institute of Technology  
Dr. Gabrielle Long, National Institutes of Science and Technology  
Professor Tom Russell, University of Massachusetts

Sub-panel 4: Condensed Matter Physics

Professor Jack Crow, Florida State University—Chair  
Dr. Don Gubser, Naval Research Laboratory  
Professor Steve Louie, University of California, Berkeley  
Professor Martin Moskovits, University of California, Santa Barbara  
Professor Sidney Nagel, University of Chicago  
Dr. Ellen Stechel, Ford Motor Company—was not able to attend  
Professor John Wilkins, The Ohio State University

Sub-panel 5: Materials Chemistry

Professor Matthew Tirrell, University of California, Santa Barbara—Chair  
Professor Frank DiSalvo, Cornell University  
Dr. Bruce Kay, Pacific Northwest National Laboratory  
Professor Janice Reutt-Robey, University of Maryland  
Professor Giacinto Scoles, Princeton University

**IV. The Review Process**

The review was carried out on March 17, 18, 2003. The entire membership of the COV arrived the prior evening (March 16) and the review began promptly in the morning of Monday, March 17. The COV was charged with evaluating the performance of the programs for the period covered by fiscal years 2000, 2001, and 2002. The overall agenda for the 2 days of the COV is included as Appendix 1 of this report. The review began with a general overview of the Office of Basic Energy Sciences given by Dr. Patricia Dehmer. Dr. Iran Thomas was actively involved in planning and organization for the COV up to the time of his death on February 28, 2003. Following her general overview of BES, Dr. Dehmer then gave a presentation that had been organized by Dr. Thomas to provide an overview of the Materials Science programs. Altaf Carim then gave an overview presentation of the Office of Science Information Management system

(IMSC = Information Management for the Office of Science) Dr. Hemminger then discussed the details of the review process and logistics.

Following the general overviews, the committee divided into the sub panels described previously and met with the appropriate program managers. Each program manager presented a short overview of the specific program including details on program scope and portfolio descriptions, distinguishing features, relevance, program evolution and anticipated changes, and budget profiles. The sub panels then proceeded to evaluate the program jackets that were provided to them. The program managers had been instructed to provide program jackets that included both university and laboratory projects, and a range of decision outcomes (funded, and declined). The program managers were asked to include several easy “fund” and easy “decline” cases as well as cases that were “at the decision margin.” The program managers remained available to the sub-panel to provide any additional documentation or oral explanation requested by the sub-panels during the evaluation process.

The expertise and research backgrounds of the sub-panel members allowed them to evaluate not only the decision-making procedures, but also issues such as the appropriateness and quality of referees selected, the breadth of referees, and the quality of the referee reports. The members’ expertise also allowed them to provide informed evaluations of the judgment exercised by the program manager in making funding decisions. The sub-panel members also evaluated the documentation of the funding decision. The first reading of the jackets by the sub-panels occupied the remainder of the morning and part of the afternoon of the first day of the review. The sub-panels then prepared preliminary conclusions that were presented verbally to the COV as a whole in executive session. Each sub-panel was also asked to assign one member to review a number of EPSCOR program jackets that were provided for review.

At the beginning of the 2<sup>nd</sup> day of the review, the COV was divided into 5 “second-read” sub-panels—one assigned to each program area. One member of each second-read sub-panel was assigned as “coordinator” for the second read. The second-read sub-panels carried out an independent review of the program’s jackets, review processes, decision-making, and documentation. The membership of each second-read sub-panel was independent of the original first-read sub-panels.

In the 2<sup>nd</sup> half of the morning of the second day the COV divided into “merge” sub-panels. The “merge” sub-panels were constituted of the members of the original first-read sub-panels except that the “coordinator” of each “second-read” sub-panel stayed with that topical sub-panel. The “coordinator” of the “second-read” sub-panel was tasked with transmitting the findings of the second-read to the merge group. The “merge” sub-panels drafted reports for the five program areas. The original sub-panel chairs then presented the reports verbally to the combined COV in executive session.

The COV came together as a whole for a working lunch on the second day of the review with members of the BES program staff. Immediately following lunch, Altaf Carim presented additional statistical data on the Materials Science programs in response to COV questions from the previous day. The final executive session of the combined COV was used to identify cross cutting issues, and prepare the overall conclusions of the COV. The detailed discussions of this last combined meeting of the COV form the primary basis for this report.

## **V. Discussion and Recommendations**

The COV concluded that the research being funded by the programs under review is of exceptionally high quality. In addition, the sub-panels were in agreement with the specific funding decisions made in each of the program areas. It is clear that the research programs support high quality science that is relevant to the Department of Energy. All members of the COV lauded the openness of the BES staff to the review process. The support for the COV provided by the BES staff was outstanding.

A number of conclusions and recommendations were identified that apply broadly to all of the programs within the Materials Science and Engineering Division. These cross-cutting issues will be discussed first in the remainder of this document, followed by comments on specific programs. The cross-cutting issues include the need for a significantly improved computerized database (IMSC). It was also broadly recognized that the level of staffing of BES is very "lean". There is concern that under such conditions, staff turnover, due to retirements or other causes, can have a negative effect on the excellent programs that are in place.

## Documentation

One of the conclusions of the first BES–COV (Chemistry Programs) was that there was a need for standardization of the documentation of decisions, processes, reviews, etc. We were pleased to observe that the implementation of this recommendation was well along the road to completion. The folders associated with university programs were found to be uniformly organized and complete. Generally these folders were organized in a standard manner and the decision-making process (e.g., fund/not fund) was clear. A similar transition for the laboratory programs is underway as evidenced by the few folders associated with new laboratory programs that were reviewed by the Chair of this COV (John Hemminger—also a member of the previous COV). Carefully formulated and organized documentation of programs serves not only to justify funding actions, but also to streamline the jobs of the program managers and in particular to help new program managers come up to speed. Our specific recommendations for enhancements to the documentation are listed below.

- A timeline/document page should be developed that would be affixed to the inside cover of every project folder. This page could contain a **check off list** with all critical milestones in the proposal process, with space to enter dates and comments. It would then be abundantly clear if/when a major step in the process did or did not occur. In addition to providing the program manager with an “at a glance” understanding of the status of a proposal it would greatly enhance “after the fact” general reviews such as this COV. We note that this was also a specific recommendation of the earlier Chemistry Programs COV.
- The use of mail peer reviews is an integral part of the decision making process for BES. This COV believes that the review process would be improved if a reviewer “report form” were developed to help ensure that the reviewer provides as much appropriate information as possible. In particular, the report form should attempt to force the reviewer to make a specific recommendation. The consensus of the COV, however, was not in favor of the implementation of a numerical scoring process, or an “excellent”, “very good”, “good”, etc. such as is in use by NSF, since such schemes tend to suffer

from “grade inflation”. The textual comments of a reviewer should remain the most important aspect of a mail review.

### **Information Management**

The Office of Science information management system is **ineffective** in many ways. The database (IMSC) system needs to be developed so that a program manager can make queries of the database (IMSC) combining any database (IMSC) fields and applying any particular conditions. Such a database (IMSC) is essential for the program managers to perform their jobs. The result of the present ineffective database (IMSC) is that many program managers have developed their own “shadow” systems. Such “shadow” systems take valuable time and effort to develop and are of uneven quality and usefulness. In addition to increasing the effectiveness of a program manager, a high quality database (IMSC) on all the BES research programs would greatly enhance the development of reporting statistics that would be invaluable for a review such as this COV. A few specific comments follow:

- We were surprised to learn that the DOE Office of Science does not collect information on the human diversity of the PI’s and researchers associated with proposals. Other than in an anecdotal manner, it is impossible to evaluate whether women and minorities make up an appropriate component of the funded researchers. While the anecdotal evidence suggests that the programs funded by BES–Materials Science and Engineering Programs are appropriately diverse it is important that this be documented. We recommend that the DOE Office of Science implement a policy, similar to that employed by the NSF, in which such information is collected at the time of submission of each proposal in a way that it can be included in a statistical database without being included in the tracking folder for the proposal.
- The development of a “reviewers database” would be a tremendous asset to the BES program managers—as well as a service to the reviewing community. Such a database should include, in addition to the name and contact information for a reviewer, information on fields of expertise, typical response time to review requests, number of proposals they were asked to review by BES during the last year, time since last review request, number of outstanding reviews, etc. Once again, the lack of a centralized



database such as this has resulted in the generation of a multitude of shadow databases of variable content and information quality by the various program managers. Such a database would be most valuable if it was designed in such a manner that the information is automatically updated as review solicitations were generated, and review reports were received.

### **The Proposal Review Process**

Expert mail reviews are utilized as the primary proposal evaluation process for university proposals. In the evaluation of laboratory field work proposals (fwps) such mail reviews are, in some cases, supplemented by site reviews. In general we found the choice of reviewers to be very appropriate and the quality of the reviews to be excellent. The flexibility that program managers have in making the final funding decisions is viewed as a particularly strong aspect of the BES decision-making process. The opportunity for PI's to respond to reviews prior to a funding decision is also viewed as a strong component of the process; however, this seems to be applied in a somewhat arbitrary and spotty way. We have a few specific recommendations related to the mail review process as listed below:

- It would be very valuable if verbatim copies of the text of the reviews were transmitted to the PI's in all cases (in such a manner as to keep confidential the identity of the reviewer. The COV recognizes that preservation of reviewer anonymity may require minor deletions of partial text of a review.). This would be valuable not only for proposals that were not funded but also for funded projects, since often reviews contain suggestions or comments that might prove useful to the project.
- The issue of conflicts of interest of reviewers is not handled in a uniform manner and is potentially problematical. Among the proposal files that this COV reviewed there were no obvious instances of reviewer conflict of interest. However, such an anecdotal approach to handling this issue is not wise. We believe that it would be beneficial for BES to generate a uniform practice regarding reviewer potential conflict of interest. We recommend two specific additions to the process:

- PI's should be asked to supply a list of mentors, former students and postdoctoral associates (last 5 years), and collaborators (last 5 years) as part of the proposal submission.

- A set of "conflict of interest" guidelines should be included with each review solicitation.

We should also point out that *potential* conflicts of interest should not in and of themselves rule out any particular reviewer. Often such reviewers can provide significant insight into the qualities of a proposal. However, with potential conflicts of interest identified, the program manager is in the best position to appropriately utilize the resulting review.

### **Project Monitoring**

Program managers utilize a number of tools to monitor the progress of on-going DOE-laboratory projects including, reports, site visits, and on-site reviews by external teams, etc. In contrast, there appears to be less monitoring of university projects in between renewal proposals that normally occur on a 3-year schedule. Annual reports are required and do provide a basis for program managers to stay in tune with a project. Program managers also have the opportunity to attend some national scientific meetings where they can interact with PI's and hear about recent results. We view these opportunities as particularly valuable and important to protect from shortsighted budgetary constraints. We would recommend that consideration be given to a more widespread use of "contractor's" meetings. Contractor's meetings provide a number of benefits in addition to allowing the program manager to remain up to date on project progress. Such meetings provide a way for the community to meet and often are the starting points for significant scientific collaborations. We would recommend that contractor meetings not be limited only to presently funded PI's but rather should include a small number of scientists not funded by BES. This would both provide an external comparison to the program, as well as providing information to the scientific community on the nature of the BES programs. It would be especially valuable to invite younger members of the community who are not funded by BES to such contractor's meetings. It is our understanding that such meetings are more common in the Chemistry Division

where they have been found to be an effective means of project monitoring as well as program development. Travel by program managers to attend national meetings and to visit PI laboratories is a very effective way for them to monitor on-going programs as well as to identify and encourage new PI's. Such opportunities would greatly enhance the effectiveness of the program managers.

### **Program Quality**

The COV was uniformly impressed with the outstanding quality of the science being funded by the Materials Science and Engineering programs of BES. The top programs are clearly world-class. There is some concern that the continued flat (at best) funding that occurs for many on-going projects may eventually lead to a situation where the project cannot be carried out at the "world-class" level. While it might require "difficult" decisions, some consideration should be given to increasing the grant size of funded projects, even at the expense of not funding some projects at the decision margin.

### **EPSCoR Proposals**

Each of the five sub panels assigned one member to read a number of EPSCoR folders. These members of the COV were uniformly impressed with the quality of science and the care and attention given to the development of the proposal packages. The organization of the folders was outstanding and provided clear documentation on the review and decision process. The managers of this program should be commended for their excellent management and oversight. Clearly, BES is making excellent use of the EPSCoR program to bring science projects of outstanding quality into their programs.

### **The COV Process**

The COV process relied heavily on the BES staff and the COV members were uniformly impressed with the help and availability of the staff and program managers during this process. It was obvious that the program managers had worked hard to prepare for the COV and that they were genuinely interested in the feedback from the community. This attitude is indeed impressive and was highly appreciated by the COV. We strongly recommend that the COV process for BES be continued on a regular basis. Implementation of the recommendations we have made related to information management within the Office of Science would greatly facilitate future COV's. In particular, the following specific additional information would be useful to future COV's:

- Reliable statistics on longevity of projects for all the programs
- Reliable statistics on diversity of PI's and researchers funded by the programs
- A complete listing of proposals received by each program during the 3 year period of evaluation, including information on outcome (fund/not fund), reviewers used, previous funding history of the PI, etc.
- Data on length of time from submission to funding decision

### **Program Specific Recommendations**

The quality of the science in the funded proposals was outstanding in all five Programs.

#### Materials Physics

- There is a concern that mail review for groups of large, interconnected proposals, if used to the exclusion of site reviews, may lose sight of the interconnectedness of the proposals, the importance of infrastructure, etc. Perhaps a combination of the two would be appropriate.
- The timeliness of funding decisions for the folders that were reviewed was spotty, some were in the review process for more than one year.
- The award levels are generally too small, this program may obtain better overall science by increasing grant size at the expense of the number of funded projects.

#### Synthesis and Process Sciences and Engineering Physics

- Anecdotally, the review of proposals seemed to be timely, but there appeared to be no structured record keeping on the timeliness of the review process.
- It would be valuable for verbatim reviews (with anonymity preserved) to be provided to the PI's for all proposals.

- For field work proposals from the national labs, breaking proposals into topically separate FWPs with individual reviews of these distinct FWPs may be more useful than submission and review of large FWPs which are concatenations of topically dissimilar research programs.

#### X-ray and Neutron Scattering

- The program manager is responding well to emerging opportunities
- The program manager indicated that as a result of programmatic pressures, there may be a future emphasis on neutron scattering. The COV is uncomfortable with the possibility that excellent science in x-ray scattering may be sacrificed

- The internal report produced by the program manager in cases that involved negative external reviews sometimes did not mention or address the negative reviews when the program manager recommended funding. The program manager's funding decision report should discuss negative reviews in light of the reasons for the funding decision.

- Verbatim copies of peer reviews (with anonymity preserved) should be provided to all PI's

#### Condensed Matter Physics

- The flexibility exercised by the program managers is valuable and wisely used
- The staffing level of the condensed matter physics program is of special concern.

The program has lost two managers due to retirements and is currently being managed by one individual with a second individual starting in April. The subcommittee urges BES management to work with the program to assure adequate support for new hires and contracted support

- In reviewing funding trends for the last ~10 years it was revealed that some awards were made at levels that may be too small to be useful (~\$50,000). The impact of BES investment at this level is questionable

#### Materials Chemistry

- We felt that the program managers exercised good judgment and made appropriate positive funding decisions in some cases where there was one negative review. We applaud the fact that program managers sometimes funded high-risk proposals

- Given the evident increasing power of theory and computation, materials chemistry should seriously consider including a larger percentage of theory and computation in the portfolio of the programs grants

- Industrial reviewers represent an under-utilized resource, although when they are asked to serve as referees, they may need more thorough information on the appropriate criteria for reviews

**APPENDIX 1**

**COV Agenda**

**March 17, 18, 2003**

**Basic Energy Sciences Advisory Committee**  
**Committee of Visitors Review of the Materials Sciences and Engineering Division**  
**March 17-18, 2003 - DOE - Germantown Complex**

<b>Time</b>	<b>Monday, March 17, 2003</b>	<b>Activity</b>	<b>Room</b>
8:00am	Shuttle Pickup in front of hotel		
8:30am - 9:00am	Welcome and Introduction Overview of Basic Energy Sciences	Patricia Dehmer, Director, Office of Basic Energy Sciences	A-410
9:00am - 9:30am	Overview of the Materials Sciences and Engineering Division	Patricia Dehmer, Acting Director, Materials Sciences and Engineering Division	A-410
9:30am - 9:45am	Summary of the Office of Science Information Management System (IMSC)	Tof Carim, Division of Materials Science and Engineering	A-410
9:45am - 10:15am	Plans, Schedule, and Logistics	John Hemminger (COV Chair)	A-410
10:15am - 10:30am	Break		
10:30am - 12:00pm	Breakout Session – First Read Begins <ul style="list-style-type: none"> <li>• Subpanel presentations</li> <li>• Questions and Answers</li> <li>• Preliminary Review of Folders</li> </ul>	<u>1<sup>st</sup> Read Breakout Groups Begin w/ BES Program Managers</u> Group 1 Materials Physics Group 2 Synthesis, Processing and Engineering Sciences Group 3 Neutron and X-ray Scattering Group 4 Condensed Matter Physics Group 5 Materials Chemistry	E-301 E-114 G-207 E-401 G-426
12:00pm - 12:30pm	General Discussion	COV Members and BES	E-401
12:30pm - 1:30pm	Lunch		
1:30pm - 3:30pm	Breakout Session – First Read Continues <ul style="list-style-type: none"> <li>• Review Folders</li> <li>• Formulate Comments</li> </ul>	<u>1<sup>st</sup> Read Breakout Groups</u> Group 1 Materials Physics Group 2 Synthesis, Processing and Engineering Sciences Group 3 Neutron and X-ray Scattering Group 4 Condensed Matter Physics Group 5 Materials Chemistry	E-301 E-114 G-207 E-401 G-426
3:30pm - 4:00pm	COV Executive Session	COV Members	E-401
4:00pm - 4:30pm	COV and BES Discussion	COV Members and BES	E-401
5:30pm - 6:30pm	Cash Bar and Reception	COV Members and BES	Marriott
6:30pm - 8:00pm	Dinner for COV and BES	COV Members and BES	Marriott
	<b>Tuesday, March 18, 2003</b>		
8:30am - 10:00am	Breakout Session – Second Read Begins <ul style="list-style-type: none"> <li>• Review of Folders and Comments of First Read</li> <li>• Formulate Comments</li> </ul>	<u>2<sup>nd</sup> Read Breakout Groups</u> Group 1 Materials Physics Group 2 Synthesis, Processing and Engineering Sciences Group 3 Neutron and X-ray Scattering Group 4 Condensed Matter Physics Group 5 Materials Chemistry	E-301 E-114 G-207 E-401 G-426
10:00am - 12:00pm	Breakout Session – Merge Session and Wrap-Up <ul style="list-style-type: none"> <li>• Review 1<sup>st</sup> and 2<sup>nd</sup> read Comments</li> <li>• Formulate points for report</li> <li>• Begin Preparing Report</li> </ul>	<u>Merge Session Breakout Groups</u> Group 1 Materials Physics Group 2 Synthesis, Processing and Engineering Sciences Group 3 Neutron and X-ray Scattering Group 4 Condensed Matter Physics Group 5 Materials Chemistry	E-301 E-114 G-207 E-401 G-426
12:00pm - 1:00pm	Working Lunch	COV Members	A-410
1:00pm - 2:00pm	Summary Discussion	John Hemminger, COV Members and BES	A-410
2:00pm - 4:00pm	COV Executive Session	COV Members	A-410
4:00pm - 5:00pm	COV and BES Closeout Discussion	COV Members and BES	A-410
5:00pm	Adjourn		

**EPSCoR:** There will not be a separate sub-panel for the EPSCoR folders, and there is no presentation for EPSCoR program either. The POC for EPSCoR is Mat Varma, who will have a selection of EPSCoR folders in his office (E-422) for all interested COV members to peruse.



## APPENDIX 2

### COV SUB PANEL ASSIGNMENTS

**COV CHAIR: JOHN C. HEMMINGER**

First Read	Second Read	Merge Session
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Materials Physics	Materials Physics	Materials Physics
Phillips, Julia (Chair)	DiSalvo, Frank (Coordinator)	Phillips, Julia (Chair)
Ast, Dieter	Crow, Jack	Ast Dieter
Bravman, John C.	Scoles, Giacinto	Bravman, John C.
Gibala, Ron	Wilkins, John	DiSalvo, Frank*
Peercy, Paul		Gibala, Ron

SP&ES	SP&ES	SP&ES
Atwater, Harry (Chair)	Gubser, Don (Coordinator)	Atwater, Harry (Chair)
French, Roger	Gibala, Ron	French, Roger
Handwerker, Carol	Louie, Steve	Gubser, Don*
Johnson, David	Reutt-Robey, Janice	Handwerker, Carol
Joseph, Daniel	Tirrell, Matt	Joseph, Daniel

X-ray and Neutron Scattering	X-ray and Neutron Scattering	X-ray and Neutron Scattering
Brown, Gordon (Chair)	Moskovits, Martin (Coordinator)	Brown, Gordon (Chair)
Chen, S.	Joseph, Daniel	Chen, S.
Long, Gabrielle	Nagel, Sidney	Long, Gabrielle
Russell, Tom	Phillips, Julia	Moskovits, Martin*
		Russell, Tom

Condensed Matter Physics	Condensed Matter Physics	Condensed Matter Physics
Crow, Jack (Chair)	Peercy, Paul (Coordinator)	Crow, Jack (Chair)
Gubser, Don	Atwater, Harry	Louie, Steve
Louie, Steve	Bravman, John C.	Nagel, Sidney
Moskovits, Martin	French, Roger	Peercy, Paul*
Nagel, Sidney	Handwerker, Carol	Wilkins, John
Wilkins, John	Kay, Bruce	
	Long, Gabrielle	

Materials Chemistry	Materials Chemistry	Materials Chemistry
Tirrell, Matt (Chair)	Johnson, David (Coordinator)	Tirrell, Matt (Chair)
DiSalvo, Frank	Ast Dieter	Johnson, David*
Kay, Bruce	Brown, Gordon	Kay, Bruce
Reutt-Robey, Janice	Chen, S.	Reutt-Robey, Janice
Scoles, Giacinto	Russell, Tom	Scoles, Giacinto

\*Coordinator from Second Read

**SP&ES = Synthesis, Processing and Engineering Sciences**