

**The 2009 Committee of Visitors  
Review of the  
Office of Fusion Energy Sciences**

Presented to the  
Fusion Energy Sciences Advisory  
Committee  
March 9, 2010

# Committee of Visitors Members

Name		Current Affiliation	Type of Institution			Years There	Geographical Region				Expertise						
First	Last		Lab	Industry	University		North East	South East	Central	West	Tokamaks	Diagnostics	ICCs	Theory/Comp	HEDLP	Basic Plasma Sci	Materials
Bruno	Bauer	U. Nevada			x	13				x		x	x	x	x		
Eric	Blackman	U. Rochester			x	8	x						x		x		
Troy	Carter	UCLA			x	8				x	x	x			x		
Vincent	Chan	GA		x		34				x	x		x				
Jill	Dahlburg	NRL	x			20	x					x	x	x	x	x	x
Chris	Hegna	U. Wisconsin			x	19			x			x	x				
Rulon	Linford	LLNL	x			5				x		x					
Bill	Lotko	Dartmouth C.			x	25	x						x		x		
Richard	Majeski	PPPL	x			17	x				x	x	x			x	x
Dale	Meade	FIRE		x		4	x				x						
Ellen	Meeks	Reaction Design		x		11				x			x		x		
Joe	Minervini	MIT			x	25	x										x
Dave	Rasmussen	ORNL	x			28		x			x	x	x			x	x
Chuang	Ren	U. Rochester			x	5	x							x	x		
Fred	Skiff	U. Iowa			x	11			x		x	x		x		x	
Jim	Terry	MIT			x	31	x				x	x					
Ed	Thomas	Auburn U.			x	9		x			x	x	x			x	

# Review Periods

Name of Subcommittee	Fiscal Years
Tokamaks and Diagnostics	2006-2009
Enabling Research and Development (R&D)	2006-2009
Innovative Confinement Concepts (ICC)/Plasma Science	2005-2009
High Energy Density Laboratory Plasmas (HEDLP)	2005-2009
Theory and Computation	2004-2009

# Subcommittee Assignments

First Name	Last Name	Subcommittee	Ldr
Ed	Thomas	Tokamaks and Diagnostics	x
Chris	Hegna	Tokamaks and Diagnostics	
Joe	Minervini	Tokamaks and Diagnostics	
Dale	Meade	Enabling R&D	x
Bruno	Bauer	Enabling R&D	
Troy	Carter	Enabling R&D	
Jim	Terry	ICC and Plasma Science	x
Bill	Lotko	ICC and Plasma Science	
Dave	Rasmussen	ICC and Plasma Science	
Chuang	Ren	ICC and Plasma Science	
Jill	Dahlburg	HEDLP	x
Vincent	Chan	HEDLP	
Fred	Skiff	HEDLP	
Eric	Blackman	Theory and Computation	x
Richard	Majeski	Theory and Computation	
Ellen	Meeks	Theory and Computation	
Rulon	Linford	COV Chair	

# COV Activities

July 13 – First conference call

July 14 – Call between COV chair and OFES managers

July 21 – Last conference call

August 17-19 – Visit to OFES

December 11 – Sent final draft to FESAC chair

# Grouping of Findings and Recommendations

## A. Efficacy and Quality of OFES Processes

1. Processes to [solicit and review](#) proposals and applications, to recommend award or declination of funds, and to [document](#) these actions
2. Processes to [monitor](#) active awards, projects, and programs

## B. Effect of the Award Process on Portfolios

1. [Breadth and depth](#) of portfolio elements
2. [National and international standing](#) of portfolio elements

## II. Selected Findings and Recommendations

This section contains findings and recommendations that the COV selected for special emphasis. Most of them have supporting findings and recommendations in one or more of the subcommittee reports that follow. However, many important findings and recommendations are **only** found in the subcommittee reports.

## II. Selected Findings and Recommendations

This section contains findings and recommendations that the COV selected for special emphasis. Most of them have supporting findings and recommendations in one or more of the subcommittee reports that follow. However, many important findings and recommendations are **only** found in the subcommittee reports.

This section is not an executive summary.



## A. Efficacy and Quality of OFES Processes: 1. solicit and review

### ***Findings:***

Overall, the processes are sound and improvements are evident. As noted by the last COV Report (Tokamak Research and Enabling R&D, May 2006) earlier COV recommendations have resulted in more complete and useful proposal folders. Substantial additional improvements in documentation and processes were noted during this review. We commend the OFES managers for these continuing improvements. They demonstrate that OFES managers take pride in their work.

## A. Efficacy and Quality of OFES Processes: 1. solicit and review

### ***Findings:***

Overall, the processes are sound and improvements are evident. As noted by the last COV Report (Tokamak Research and Enabling R&D, May 2006) earlier COV recommendations have resulted in more complete and useful proposal folders. Substantial additional improvements in documentation and processes were noted during this review. We commend the OFES managers for these continuing improvements. They demonstrate that OFES managers take pride in their work.

We also commend the OFES for the management of stimulus funds provided through the American Recovery and Reinvestment Act. Despite the short timeline, the activities have been or will be peer reviewed prior to award.

## A. Efficacy and Quality of OFES Processes: 1. solicit and review

### ***Findings:***

However, we found anomalies in the management processes used in some program areas funded through the usual appropriations. Peer review was not always used to evaluate proposals for new starts or extensions.

## A. Efficacy and Quality of OFES Processes: 1. solicit and review

### ***Findings:***

However, we found anomalies in the management processes used in some program areas funded through the usual appropriations. Peer review was not always used to evaluate proposals for new starts or extensions.

In a few cases, solicitations were either so broad or incompletely defined that even the reviewers were uncertain about what criteria to use in scoring proposals. Large variances in scores were one of the consequences. Properly focused solicitations allow clear expectations and criteria to be conveyed to both the proposers and the reviewers. Multiple focused solicitations are often better than one overly broad solicitation.

## A. Efficacy and Quality of OFES Processes: 1. solicit and review

### ***Findings:***

In one program element no solicitations were reported during the review period. We recognize the value of continuity for strong research activities, and that regularly re-competing every activity would not necessarily improve productivity. However, carefully designed solicitations are an important tool for revitalizing or replacing weaker activities, for maintaining the credibility of the program, and for keeping programs focused on the most important tasks, which evolve as knowledge is gained. Every program element would benefit from skillful use of solicitations, even those with shrinking budgets.

## A. Efficacy and Quality of OFES Processes: 1. solicit and review

### ***Recommendations:***

Use peer review consistently across all program elements to ensure quality, balance, and credibility.

## A. Efficacy and Quality of OFES Processes: 1. solicit and review

### ***Recommendations:***

Use peer review consistently across all program elements to ensure quality, balance, and credibility.

Employ carefully designed solicitations to respond to the needs within every program element.

## A. Efficacy and Quality of OFES Processes: 1. solicit and review

### ***Recommendations:***

Use peer review consistently across all program elements to ensure quality, balance, and credibility.

Employ carefully designed solicitations to respond to the needs within every program element.

Ensure that all solicitations are properly focused with clear expectations and criteria.



## A. Efficacy and Quality of OFES Processes: 1. [document](#)

### ***Findings:***

The reasons for selection or declination were not found in many folders. This lack was of particular concern when the decision was not obviously based on the ranking of reviewer scores.

## A. Efficacy and Quality of OFES Processes: 1. [document](#)

### ***Findings:***

The reasons for selection or declination were not found in many folders. This lack was of particular concern when the decision was not obviously based on the ranking of reviewer scores.

In at least one case the documentation for how such decisions were made was not available even in a master file for the solicitation, but had to be obtained from the program manager.

## A. Efficacy and Quality of OFES Processes: 1. [document](#)

### ***Findings:***

The reasons for selection or declination were not found in many folders. This lack was of particular concern when the decision was not obviously based on the ranking of reviewer scores.

In at least one case the documentation for how such decisions were made was not available even in a master file for the solicitation, but had to be obtained from the program manager.

One OFES manager personally called every proposer to inform them of the funding decision, explaining the reasons for every declination and providing advice for the future. This good practice yields benefits to all involved. However, the more common practice in OFES appears to be sending a form letter that contains neither specific reasons for a declination nor statistics related to the selection process.

## A. Efficacy and Quality of OFES Processes: 1. [document](#)

### ***Recommendations:***

Document the reasons for a selection or a declination in every folder.

## A. Efficacy and Quality of OFES Processes: 1. [document](#)

### ***Recommendations:***

Document the reasons for a selection or a declination in every folder.

Include reasons for declination and/or some specific context for the selection outcome in the communication to the proposer.

## A. Efficacy and Quality of OFES Processes: 2. [monitor](#)

### ***Finding:***

Simplifying and standardizing methods of reporting and tracking progress help both the researcher and the program manager. NSF has an on-line progress report mechanism that also facilitates the entry and tracking of publications.

## A. Efficacy and Quality of OFES Processes: 2. [monitor](#)

### ***Finding:***

Simplifying and standardizing methods of reporting and tracking progress help both the researcher and the program manager. NSF has an on-line progress report mechanism that also facilitates the entry and tracking of publications.

### ***Recommendation:***

Employ web-based tools to facilitate reporting of progress and tracking of achievements.

## B. Effect of the Award Process on Portfolios: 1. **Breadth and depth**

### ***Findings:***

Senior management in OFES articulated a clear mission and a set of priorities for the program. These appear to be well supported by the program managers.

Progress toward major program goals is evident and documented. This progress and the technical strength of the program provide a sound basis for supporting ITER and preparing for major next steps in the domestic program in certain areas.

However, some elements of the portfolio have become very weak.

Unfortunately these elements are essential for providing the technical understanding needed to make a future decision to build a fusion energy demonstration plant. These include materials and technologies necessary for fusion. This situation puts at risk the ability of the domestic program to benefit effectively from corresponding elements in foreign programs. Relatively modest investment in these areas could substantially improve this outlook.



## B. Effect of the Award Process on Portfolios: 1. Breadth and depth

### ***Recommendation:***

Take immediate steps to strengthen some of the hardest hit areas that critically impact the ultimate success of the domestic program.

## B. Effect of the Award Process on Portfolios: 1. **Breadth and depth**

### ***Findings:***

We discovered at the beginning of the COV visit that OFES and the COV had interpreted the scope of the charge differently with regard to major facility operations and construction projects, such as ITER. OFES had prepared for interactions only on the research portion of the program while the COV intended to review all parts of the program. However, OFES managers in both areas were very willing to interact with the appropriate COV subcommittees and answer questions.

## B. Effect of the Award Process on Portfolios: 1. **Breadth and depth**

### ***Findings:***

We discovered at the beginning of the COV visit that OFES and the COV had interpreted the scope of the charge differently with regard to major facility operations and construction projects, such as ITER. OFES had prepared for interactions only on the research portion of the program while the COV intended to review all parts of the program. However, OFES managers in both areas were very willing to interact with the appropriate COV subcommittees and answer questions.

From these interactions it appears that little documentation exists at OFES on the processes used by the US ITER Project Office (USIPO) at ORNL to fund technical work at US institutions. This technical work consists of supporting R&D for various aspects of the design and uses capabilities that are similar to those in the research elements of the US program.

## B. Effect of the Award Process on Portfolios: 1. **Breadth and depth**

### ***Findings:***

We understand that rapid response is required for most of the R&D requested and funded by the USIPO, making the normal solicitation process impractical. However, announcing the needs and then the selection when it is made would improve transparency and credibility. In addition, documentation of all such activities, including selection process, funding, resources, and results, is important for future assessments and decisions. These include making program balance and funding decisions by OFES, and assessing the breadth, depth and standing of the US program by OFES and future COVs.

## B. Effect of the Award Process on Portfolios: 1. Breadth and depth

### ***Recommendations:***

Assure that R&D activities in the US funded by ITER use processes and documentation as close to those used by other OFES research elements as possible.

## B. Effect of the Award Process on Portfolios: 1. Breadth and depth

### ***Recommendations:***

Assure that R&D activities in the US funded by ITER use processes and documentation as close to those used by other OFES research elements as possible.

Provide future COVs a charge that clearly includes major facility operations and construction projects, including ITER, as well as the research elements of the OFES program.

## B. Effect of the Award Process on Portfolios: 1. Breadth and depth

### ***Finding:***

Enhanced coupling among theory, computations, and experiments would strengthen the research portfolio. Experimentally validated theory and models lead to enhanced understanding and improved predictive capability. During interviews with OFES managers we learned that it has been difficult to develop solicitations that incorporate all three elements because they would involve more than one part of OFES.

## B. Effect of the Award Process on Portfolios: 1. **Breadth and depth**

### ***Finding:***

Enhanced coupling among theory, computations, and experiments would strengthen the research portfolio. Experimentally validated theory and models lead to enhanced understanding and improved predictive capability. During interviews with OFES managers we learned that it has been difficult to develop solicitations that incorporate all three elements because they would involve more than one part of OFES.

### ***Recommendation:***

Develop effective and streamlined mechanisms to manage solicitations that foster interactions among theory, computations, and experiment.



## B. Effect of the Award Process on Portfolios: 1. Breadth and depth

### ***Finding:***

The new Office of Science Early Career Research Program provides a promising path for a new and more diverse group of researchers to participate in OFES programs without jeopardizing existing programs. However, it is important to track its effectiveness in achieving these goals.

## B. Effect of the Award Process on Portfolios: 1. **Breadth and depth**

### ***Finding:***

The new Office of Science Early Career Research Program provides a promising path for a new and more diverse group of researchers to participate in OFES programs without jeopardizing existing programs. However, it is important to track its effectiveness in achieving these goals.

### ***Recommendation:***

Collect and analyze data on the Early Career Research Program participants and their institutions, including diversity, achievements such as tenure, and continuation of funding from OFES.

## B. Effect of the Award Process on Portfolios: 2. National and international standing

### ***Findings:***

OFES managers provided anecdotal information to demonstrate that the US program is valued internationally. Specific requests from ITER for tests to be run on US facilities are examples.

## B. Effect of the Award Process on Portfolios: 2. National and international standing

### ***Findings:***

OFES managers provided anecdotal information to demonstrate that the US program is valued internationally. Specific requests from ITER for tests to be run on US facilities are examples.

However, some elements of the US program have become weak, as noted above, and their international standing affected as noted in the FESAC report "Priorities, Gaps and Opportunities: Towards a Long-Range Strategic Plan for Magnetic Fusion Energy", DOE-SC-0102.

## B. Effect of the Award Process on Portfolios: 2. National and international standing

### ***Findings:***

OFES managers provided anecdotal information to demonstrate that the US program is valued internationally. Specific requests from ITER for tests to be run on US facilities are examples.

However, some elements of the US program have become weak, as noted above, and their international standing affected as noted in the FESAC report "Priorities, Gaps and Opportunities: Towards a Long-Range Strategic Plan for Magnetic Fusion Energy", DOE-SC-0102.

Collecting and analyzing metrics and measures of outstanding performance would be valuable to program managers in making appropriate decisions. Such activity can also be a motivation for researchers to strive even harder for excellence. Recognizing outstanding work, e.g., through awards, can be an effective means of enhancing the visibility and stature of program elements within the department, among peers in other science disciplines, and in the eyes of the public.

## B. Effect of the Award Process on Portfolios: 2. National and international standing

### ***Findings:***

However, data that could be used to assess national and international standing, such as citation rates of published articles or contributions to international collaborations, have not been systematically collected or analyzed. Substantial data exist in reports submitted to OFES, but they have not been assembled and tabulated in ways useful for analysis. OFES managers explained that they do not have the time to collect such metrics. They do not have modern Information Technology (IT) tools to ease such collection and analysis. They have also told COV members that attrition of administrative assistants as well as managers has increased their workload and contributed to their inability to collect these data. Such data would be very helpful to OFES and future COVs in carrying out their responsibilities.

## B. Effect of the Award Process on Portfolios: 2. National and international standing

### ***Recommendations:***

Define, collect, and analyze meaningful metrics.

## B. Effect of the Award Process on Portfolios: 2. National and international standing

### ***Recommendations:***

Define, collect, and analyze meaningful metrics.

Obtain and employ modern IT tools for data collection and analysis.



## B. Effect of the Award Process on Portfolios: 2. National and international standing

### ***Recommendations:***

Define, collect, and analyze meaningful metrics.

Obtain and employ modern IT tools for data collection and analysis.

Restore the staffing level of both administrative assistants and managers to levels needed to carry out their responsibilities including the collection of data needed to assess the quality of their program elements.

# Scope of Subcommittee Reports

Tokamak Program

DIII-D, NSTX, Alcator C-mod

International Programs

ITER, Other (e.g., EAST, K-Star, JET)

Diagnostics Program

Enabling Research and Development (R&D) Program

Plasma Technology, Advanced Design, Materials Research

Innovative Confinement Concepts and Basic Plasma Science Programs

ICC, Basic Plasma Science (including interagency), HBCU

High Energy Density Laboratory Plasma (HEDPL) Program

Theory and Computation Program

Theory, SciDAC, FSP, Junior Faculty Award Program