



## Department of Energy

Washington, DC 20585

April 26, 2005

Professor Richard D. Hazeltine, Chair  
Fusion Energy Sciences Advisory Committee  
The University of Texas at Austin  
Institute for Fusion Studies  
1 University Station, C 1500  
Austin, TX 78712-0262

Dear Professor ~~Hazeltine~~ *Richard*

I would like to express my appreciation to FESAC for the committee of visitors (COV) review of the Office of Fusion Energy Sciences' programs in the areas of Innovative Confinement Concepts, General Plasma Physics, and HEDP/Inertial Fusion Energy. A special thanks goes to the COV Panel, chaired by Dr. Jeffrey Freidberg from MIT, for a thorough examination of the program and for the excellent report that clearly states the panel's findings and recommendations.

I consider the ongoing COV process to be highly valuable, because it 1) helps me identify needed improvements to ensure that our review/award process is as fair as possible and results in a balanced portfolio of excellent science and 2) informs the fusion community of the quality of the Office of Fusion Energy Sciences' peer review/award process.

The second COV review went well, from my perspective, and I believe our future reviews will benefit from the COV Panel's recommendations.

I have attached a detailed response to your report.

Sincerely,

A handwritten signature in black ink, appearing to read "Anne", is written over the word "Sincerely,".

N. Anne Davies  
Associate Director  
For Fusion Energy Sciences  
Office of Sciences

Enclosure



# **Office of Fusion Energy Sciences**

## **Response to the Final Report of the Second OFES Committee of Visitors**

On January 26-27, 2005, a Committee of Visitors (COV) reviewed the Office of Fusion Energy Science's programs in the areas of Innovative Confinement Concepts, General Plasma Physics, and HEDP/Inertial Fusion Energy. The review was conducted in response to a charge from Dr. Raymond L. Orbach, Director of the Office of Science, to the Fusion Energy Sciences Advisory Committee (FESAC) chaired by Dr. Richard Hazeltine of the University of Texas. The COV was chaired by Dr. Jeffrey Freidberg from MIT, a member of FESAC. The COV consisted of 14 members from universities, laboratories, and industry. Some were members of the fusion community and received funding from OFES or NNSA, while others were not members of the fusion community but had related interests in plasma physics or nuclear science.

This document provides the Office of Fusion Energy Sciences (OFES) response to the final report of this Second Committee of Visitors, which was presented to the Fusion Energy Sciences Advisory Committee on April 7, 2005. This document is organized into two sections: the first provides the OFES comments on all of the major findings of the panel, and the second provides the OFES response to each of the recommendations of the panel along with actions implemented, pending, or planned by OFES management to address those recommendations that require action. In some cases, a finding has a corresponding recommendation and, thus, the OFES comments are provided in the recommendation section.

### **Findings**

In this section, the text of each of the COV's findings is provided in italics and the OFES comments follow. The page numbers refer to the page in the electronic PDF file of the report posted on the OFES web site where each of the quoted COV findings is located.

#### **A. Overall Summary**

*Page 4: Overall, the OFES staff does a very good job managing the way it solicits, reviews, awards, and monitors proposals included in the programs examined by the present COV. The staff is serious, conscientious, and dedicated in its efforts to generate a high quality research program by means of the peer review process.*

OFES appreciates the Committee's recognition of our efforts to improve our processes for soliciting and reviewing research applications and proposals. Since the publication of the January 1996 Fusion Energy Advisory Committee report entitled "A Restructured Fusion Energy Science Program," OFES has endeavored to follow its major recommendation that "a peer review process should be used as the primary mechanism for evaluating proposals, for assessing progress and quality of work, and for initiating and

terminating facilities, projects, research programs, and groups.” In 1996 there was only one grant Notice published by OFES other than the general notice published each year. In FY 2005, OFES will publish 7 Notices in addition to the general notice. Since 1996, OFES has more than doubled the number of person hours per year that are devoted to preparing grant and lab notices, selecting reviewers, planning reviews, analyzing proposals and reviewers’ comments, preparing funding recommendations for OFES management, and documenting the results of reviews.

*Page 4: For decisions on the borderline, where there can be legitimate differences of opinions, OFES has thought about the issues carefully and can provide a detailed rationale for its decisions. Often this rationale is explained in writing and included as part of the proposal folder. We urge OFES to do this for all proposals primarily to institute a history and sense of continuity for each project under consideration, which is particularly important as assignments in OFES change and personnel come and leave.*

OFES concurs with this finding, and, in the future, OFES program managers will prepare a summary of how they handle each solicitation, including an explanation of the review process and the rationale for their funding recommendations. Since OFES uses a comparative review process, some program managers prefer to prepare a summary explanation/rationale statement for all of the grant applications or proposals received in response to a solicitation, rather than a separate explanation about each grant application or proposal.

*Page 4: There is a frustration in that it takes a considerable expenditure of time and effort for community members to continually prepare and submit new proposals, which are then prioritized through a time consuming peer review process, only to have high quality proposals unfunded because of budget limitations.*

OFES shares this frustration. In nearly every review during the past four years, it has been necessary to turn down very good proposals that would have been valuable to the program had we been able to fund them.

*Page 5: The community should have confidence that the peer review process, when properly carried through, is the best approach so far in selecting which proposals to fund. Some members of the community, like some members of the COV, tend to be somewhat suspicious of the way OFES reviews their proposals, although this feeling is largely generated by a lack of knowledge of the process. The COV, once it learned first hand how OFES actually carries out the review process, was favorably impressed.*

OFES believes that this validation of the OFES review process is one very valuable outcome of the COV process. For obvious reasons of confidentiality, OFES program managers are able to provide few details about our peer review process in open forums. Thus, it is very valuable to have an independent committee review the details of our peer review process and provide its assessment of our solicitation and review processes.

## **B. Solicitation of Proposals**

*Page 5: New request for proposals (RFP's) are officially announced on the public Federal website "Grants.gov" (<http://grants.gov/>) and also listed on the DOE Office of Science website (<http://www.science.doe.gov/grants/>) ... We also note that non-government websites post links to the official proposal solicitations. These include Fusion Power Associates, <http://fusionpower.org/>, the University Fusion Association, <http://depts.washington.edu/ufa/home.html>, and the "Fire" website, <http://fire.pppl.gov/>, at PPPL ... The COV encourages OFES to consistently use all of these forms of communication to insure the widest possible awareness of program solicitations.*

OFES will continue to use a variety of ways to provide information about our lab and grant notices in a fair and open manner.

## **C. Reviewing of Proposals**

*Page 6: The COV panel was favorably impressed by the quality of the scientists chosen to review proposals.*

OFES program managers spend considerable time selecting peer reviewers, since they know that good reviewers are critical to a sound review process. OFES program managers try to attend a variety of major scientific meetings to remain cognizant of the current research interests and expertise of potential reviewers, but limitations in the OFES travel budget do not permit attendance at many of the meetings that non-fusion plasma physicists attend.

*Page 6: There is no organized computerized list of reviewers and OFES may want to consider establishing such a list in view of retirements and career changes. However, since the system is currently working, one should be careful expending too much time and energy fixing a process that is not broken.*

The Office of Science uses an information management system to process grant applications (IMSC). In addition to contact information, the IMSC database is capable of storing information on the keywords relating to the expertise of our reviewers. OFES program managers have chosen not to use this function, as it would take a great deal of work to keep this information up to date. Fortunately, the management of the Office of Science has recently obtained access to a wide variety of electronic journals, which provide up-to-date information on the current research of nearly all potential reviewers. At latest count, Office of Science program managers have access to 1487 on-line journals, including most of the major plasma physics journals.

*Page 6: In fact, a large majority of the responders from the community survey were very unclear about whether or not a unified rebuttal procedure exists and, if one did exist, did it have any impact on funding decisions.*

This finding directly relates to a recommendation below and is addressed in the recommendations section.

*Page 6: A recommendation made by the first COV, and which we heartily endorse, is to put more appropriate word correlations with each grade to help each reviewer's ranking be better calibrated against the other reviewers. For instance, rather than stating that 5 = excellent and 1 = poor, a better system might be:*

*5 = must fund*

*4 = deserves funding*

*3 = OK to fund if resources available*

*2 = marginally acceptable, fund only for a crucial programmatic need*

*1 = not acceptable, do not fund under any circumstances*

In the future, all peer review evaluation forms will include such descriptions.

*Page 6: An important issue that was identified and partially quantified by the COV concerns the variation in the reviewers' scores as compared to the average scores of all proposals within a given RFP... The implication is that the numerical scores resulting from the peer review process provide a reasonably good guideline as to which proposals should or should not be funded but are not a razor sharp, precision tool, upon which to base decisions.*

OFES program managers have long recognized that the variation in scores is an issue and have never set a strict numerical cutoff for funding recommendations. See the following comment for a more complete description of how OFES program managers develop funding recommendations.

*Page 7: The conclusion is that OFES carefully considers the reviewers rankings of the proposals but sometimes uses discretion in arriving at its final decisions; that is, awards are not based on a purely numerical ranking of the reviewers. However, based on the admittedly limited data in Appendix D, it would appear that this discretion is only used very occasionally. This is slightly worrisome in view of the fact that the deviation in the scores of the reviewers is comparable to the deviation in the average scores of the proposals.*

OFES program managers actually use their discretion to a greater extent than is apparent. In most of our reviews, approximately 25% of the applications are uniformly highly rated, approximately 25% are uniformly rated significantly lower than average, and the remaining proposals are rated near the average and/or have widely varying scores. The program managers analyze this last group of proposals and their reviews very carefully, and, in developing their funding recommendations, they use their discretion in several ways. In cases with widely varying scores, they may conclude that the narrative review does not match the numerical score, in which case they give greater weight to the narrative review. In other cases, they might decide to obtain an additional peer review. For proposals that are closely ranked around what would be a strict numerical cutoff, they independently evaluate the proposals before deciding which ones to recommend for

funding. Thus, program managers often use considerable discretion in making funding recommendations, although it is only apparent when they decide to recommend a proposal with a slightly lower rating over one with a slightly higher rating.

*Page 7: Constrained by flat budget limitations, many funding decisions go to existing projects up for renewal because of the excellence of the research and the substantial investments that have already been made in terms of experimental hardware.*

OFES does consider the level of past investment in making funding decisions. Among equally ranked proposals, OFES would normally fund continued research on an existing facility over research requiring the construction of a new facility.

*Page 7: We noted that in the cases where reviews of existing programs would lead to project termination, OFES always allowed the PIs the opportunity to prepare rebuttals. The Committee strongly endorses this practice. Additionally, the Committee was also pleased to learn that closeout funds were provided to allow the completion of on going graduate dissertation work.*

OFES views training of students as a crucial and integral part of our program. Therefore, OFES policy is to provide funding to allow graduate students to complete their dissertations whenever possible.

*Page 8: It is essential that the folder for each proposal be uniform in structure. Also, a standard summary sheet serving as the cover page would be very helpful to OFES and future COV in order to quickly assess the status of the proposal and the reason why the proposal was funded or not. In this connection, a short paragraph explaining the justification for funding or the reason for not funding should be included on the summary page.*

OFES will provide a more uniform structure for the information in the folders. The Office of Science has recently developed an automated system for preparing selection statements. This system will provide more uniform information on those proposals that were funded. Since OFES uses a comparative review process, some OFES program managers prefer to provide an overall summary for each review process rather than a separate explanation about each grant application or proposal, since this is often the best way to communicate the funding recommendations to the Division Director for a funding decision. In such cases separate explanations would be redundant.

*Page 8: It was disappointing that such data for all the programs under consideration was not available for the Committee prior to the site visit, although it was requested in the original questionnaire to OFES. The reason is that this information is not readily or easily available to OFES in spite of its obvious usefulness for internal self-assessment. This is not due to a lack of interest on the part of OFES but much more to the lack of availability of an efficient DOE information system for processing and manipulating the data. We understand that DOE-wide efforts are underway to correct this situation but this does not help the present situation for OFES or other divisions. Until this situation*

*is improved, many organizations in DOE will be lacking an important tool for internally assessing their overall performance on the review process.*

The information technology systems that the Office of Science uses to receive proposals, conduct reviews, document the review process, develop budgets, and monitor progress are not integrated or fully developed. There are several initiatives in progress to improve these shortcomings, but their completion will depend on the availability of funding over the next several years.

*Page 8: Overall, the COV believes the current peer review process can be characterized as follows. Peer review has increased the fairness of the review process, both in perception and reality. Peer review has increased the quality of the proposals as well as the quality of the reviews. There is, however, no obvious metric that shows whether or not the actual quality of the research has increased.*

The changes in the peer review process are fairly recent, whereas it would likely take several years before any improvement in the quality of research was apparent. One result of gaining experience in writing high quality proposals is that several PIs from the fusion program have successfully competed for funding from NSF programs.

*Page 8: There was also strong feeling in the community that too many “new initiatives,” while desirable in the abstract, are not very desirable in the present environment. They require substantial amounts of additional efforts in the writing and reviewing of proposals, but in a flat budget are often funded by extracting funds from given programs to free up funds for the new initiative. Thus researchers feel they are doing a lot more work re-competing for funds that were already awarded.*

Suggesting that funds are already awarded implies entitlement. In fact, new initiatives are generally developed during the budget formulation process. In a competitive funding environment, scientific research programs like the fusion program must justify their funding on an annual basis, and sometimes new initiatives within a flat budget are an important part of this justification.

#### **D. Fusion Science Center Solicitation**

*Page 8: Overall the COV was very pleased with the review procedures and the fairness of the proposal process. However, the Committee notes that the scientists asked to review the Fusion Science Center proposals were all “fusion insiders.” Since a central motivation for the fusion science centers is to increase the visibility and interaction with related areas of science, mathematics, and physics, OFES should seek to include scientists from outside the fusion program in future review processes.*

Some of the scientists involved in this review do not receive funding from OFES, although they do receive funding from DOE/NNSA. Nevertheless, OFES concurs with the point that it would be good to include more reviewers from outside the fusion program on our review panels, and OFES program managers will try to include more

outsiders for reviewing programs like the fusion science centers. Travel budget restrictions make it difficult for fusion program managers to attend many general scientific meetings, but the greater availability of electronic journals should make it possible to identify potential reviewers from related areas of science.

### **E. Funding Level of Proposals**

*Page 9: The reasons for funding at reduced levels are varied but chief among them is the desire to preserve OFES investment into experimental equipment during funding fluctuations. OFES staff is keenly aware of the dangers of consistently under-funding budget requests and how this will likely lead to PIs routinely asking for the maximum plausible funding on any proposal.*

OFES tries to find the proper balance between the number of programs funded and the amount of funding for each program. In times of flat or decreasing budgets, this is a very difficult problem.

### **F. Monitoring of Proposals**

*Page 9: Most members of the community felt that OFES does a satisfactory job monitoring the progress of research on funded proposals. Some of the smaller projects felt, however, that there was almost no contact. On the other hand, OFES has stated in their questionnaire that large projects are required to report on a weekly basis. Clearly there is a sliding scale for the level of monitoring required dependent upon the size of the project. This makes good sense, but OFES may want to have some fine-tuning internal discussions to make sure the monitoring process is uniform and that at the extremes there is not too little or not too much reporting required by the principal investigators carrying out the research.*

While program managers do not have the time or travel funds to visit small research programs, they do try to make contact with their PIs at general scientific meetings. Most program managers attend one or more meetings such as the American Physical Society Division of Plasma Physics Meeting, the Sherwood Theory Meeting, the High Temperature Plasma Diagnostic Meeting, or the Transport Task Force Meeting each year. In addition, program managers maintain telephone contact with their PIs, and the PIs are encouraged to communicate with their program managers as needed. Finally, program managers receive annual reports on all of the research projects that they manage.

## **Recommendations**

In this section, the committee's recommendations are numbered and printed in bold type. These recommendations include multiple comments, and the text of these comments is included in italics. The OFES response and actions follow in plain type.



**1. OFES should develop a uniform, clearly stated, rebuttal procedure for proposal writers.**

*The OFES recognizes that clerical procedures regarding rebuttals could be improved, but also notes that there is usually little time between when rebuttals are received and when funding decisions must be made, so the effort is focused more on decision making.*

Also, many OFES programs are arranged to review a fraction of the research projects each year. This arrangement means that at the same time the program managers are conducting peer reviews of new and renewal proposals, they are also examining progress reports and preparing continuation PRs for the remainder of the research projects in the program.

*The new PEERNET (online) review system was not designed explicitly to handle rebuttals, and any particular programming solution implemented by the OFES would be expensive.*

Following the committee visit in January, OFES program managers began discussions with the project managers at the Oak Ridge Institute for Science and Education (ORISE) on how to implement a rebuttal system. Although developing a fully integrated peer review and rebuttal system would be fairly expensive, we discovered that with modest manual intervention and modest additional cost, the existing PeerNet system could be used to manage a rebuttal process.

OFES Action: Starting with the review of theory proposals currently in progress, OFES will implement the following rebuttal process:

1. The initial peer review will proceed as it does now, with 3 or more reviewers depending on the scope of the proposal.
2. Next an ORISE project manager would consolidate all the comments of all of the individual reviewers into a single file, and this file will be made available to the PI through PeerNet to enter a rebuttal into PeerNet.
3. Finally, each reviewer will be given access to the single file containing the comments of all peer reviewers and the file contains the PI's rebuttal to all of the peer reviews so that he/she may enter final comments and a final summary rating. Peer reviewers will be urged to enter additional comments and a final summary evaluation, but if they do not, their original comments and summary evaluation will be considered final.
4. OFES program managers will use the final comments and summary evaluation in the ranking tables.
5. All of this information will be saved in the proposal folder and will be available to future Committees of Visitors.

OFES program managers feel that this process will provide some of the benefits of a review panel. When responding to the rebuttals, the reviewers would see the original comments of all of the other reviewers and would see the PI's rebuttal to their own comments as well as those of the other reviewers. In their final review, they would be

able to comment on the validity of the other reviewer's comments as well as the on the validity of the rebuttals.

OFES will use this system, which would add up to 4 weeks to the review process, whenever possible. On those occasions when time does not permit a rebuttal, such as when the Congressional appropriation comes well after the beginning of the fiscal year, the fact that rebuttals can not be accommodated would be included in the Notice that is published on grants.gov.

## **2. OFES should implement several relatively simple ideas in the peer review process to improve the accuracy of the final funding decisions.**

*First, the directions to reviewers should include descriptive correlations between numerical score and suggested funding decisions as described in Finding C.*

OFES program managers are adding outcome related language (e.g. must fund, should fund, fund if funds available ...) to the description of the numerical scores on evaluation forms.

*Second, reviewers should be allowed to offer more accurate scores using decimal values.*

Rather than using decimals, OFES will expand the rating scale from 1-5 to 1-10. This change has the same effect as allowing half integer scores.

*Third, on a related point reviewers should be discouraged from using a low score of 1 for a proposal which is technically competent but not responsive to the solicitation guidelines.*

We will make it clear that, when we send a proposal out for technical review, one or more OFES program managers have already evaluated the proposal for responsiveness to the solicitation and judged it to be responsive enough to justify a peer review. Additionally, we will be more aggressive in rejecting non-responsive proposals without peer review, so that we do not waste the time of the peer reviewers.

*Fourth, OFES should press very hard on reviewers who complete the informational portion of their reviews but for one reason or another do not enter a final numerical score.*

OFES will emphasize the importance of the summary evaluation in our review process. OFES will also consider adding a comment section so that reviewers can explain the rationale behind their summary score.

### **3. OFES should improve the uniformity and consistency of the information contained in the review folders.**

*Of particular importance is a clear, concise summary sheet containing, among other things, the funding decision, the funding level if funded, the reviewers' scores, a justification for those proposals funded, and an explanation describing why other proposals were not funded.*

OFES plans to continue to improve the documentation of peer reviews. In particular, a discussion of the recommended funding amounts versus the requested amounts will be included. However, since OFES uses a comparative review process to review proposals submitted in response to specific Notices, some program managers find it more useful to document their funding recommendations in an overall statement explaining which proposals they are recommending for funding, which they are not recommending, and why, since they think that this is the best way to communicate their funding recommendations to OFES management.

Action: OFES will develop a summary statement format, and a summary statement will be included in each folder in the future.

*Also, each folder should contain all the comments of the reviewers, the rebuttals if any, and the OFES or reviewer responses to the rebuttals.*

As described above, the new rebuttal process will allow for collection of all of this information in PeerNet, making it possible to print it out and include it in the folders.

Action: These rebuttal data will be included in each folder in the future.

*Finally, OFES could probably improve its "big picture" of the review process by creating simple overview data sheets as presented in Appendix D.*

Creation of such tables would currently have to be created mostly by hand, since our IT systems cannot produce such reports automatically. OFES program managers have analyzed a few reviews in the past and obtained a similar result: that the average standard deviation in the reviewers' scores is about 0.5. The ability to provide such data sheets would be a useful requirement to include in the specification for planned Office of Science and/or DOE systems.

Action: OFES will recommend that that such a capability be included in the specification of future IT systems designed to handle peer reviews.