

**CORE QUESTIONS and REPORT TEMPLATE
for
FY 2010 NSF COMMITTEE OF VISITOR (COV) REVIEWS**

Guidance to NSF Staff: This document includes the FY 2010 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2010. Specific guidance for NSF staff describing the COV review process is described in Subchapter 300-Committee of Visitors Reviews (NSF Manual 1, Section VIII) that can be obtained at <www.inside.nsf.gov/od/oia/cov>.

NSF relies on the judgment of external experts to maintain high standards of program management, to provide advice for continuous improvement of NSF performance, and to ensure openness to the research and education community served by the Foundation. Committee of Visitor (COV) reviews provide NSF with external expert judgments in two areas: (1) assessments of the quality and integrity of program operations and program-level technical and managerial matters pertaining to proposal decisions; and (2) comments on how the results generated by awardees have contributed to the attainment of NSF's mission and strategic outcome goals.

Many of the Core Questions are derived from NSF performance goals and apply to the portfolio of activities represented in the program(s) under review. The program(s) under review may include several subactivities as well as NSF-wide activities. The directorate or division may instruct the COV to provide answers addressing a cluster or group of programs – a portfolio of activities integrated as a whole – or to provide answers specific to the subactivities of the program, with the latter requiring more time but providing more detailed information.

The Division or Directorate may choose to add questions relevant to the activities under review. NSF staff should work with the COV members in advance of the meeting to provide them with the report template, organized background materials, and to identify questions/goals that apply to the program(s) under review.

Suggested sources of information for COVs to consider are provided for each item. As indicated, a resource for NSF staff preparing data for COVs is the Enterprise Information System (EIS) –Web COV module, which can be accessed by NSF staff only at <http://budg-eis-01/eisportal/default.aspx>. In addition, NSF staff preparing for the COV should consider other sources of information, as appropriate for the programs under review.

ARRA Addendum: If awards funded by the American Recovery and Reinvestment Act (ARRA) were made during the period of time under review by the COV, you will need to add guidance to the COV on review of these activities and some specific questions to the template that cover the ARRA award processes and the resulting portfolio of awards. While the COV need not review all ARRA awards, there should be ARRA awards included as part of the sample of awards, and there should be materials that explicitly describe the ARRA portfolio and its characteristics. The NSF Recovery Act Policies and Procedures can be found at: <http://infoshare.nsf.gov/showFile/3370/2009RecoveryPoliciesProcedures1009.pdf>. The NSF Funding Priorities are found in Section III.

Guidance to the COV: The COV report should provide a balanced assessment of NSF's performance in two primary areas: (A) the integrity and efficiency of the **processes** related to proposal review; and (B) the quality of the **results** of NSF's investments that appear over time. The COV also explores the relationships between award decisions and program/NSF-wide goals in order

to determine the likelihood that the portfolio will lead to the desired results in the future. Discussions leading to answers for Part A of the Core Questions will require study of confidential material such as declined proposals and reviewer comments. *COV reports should not contain confidential material or specific information about declined proposals.* Discussions leading to answers for Part B of the Core Questions will involve study of non-confidential material such as results of NSF-funded projects. The reports generated by COVs are used in assessing agency progress in order to meet government-wide performance reporting requirements, and are made available to the public. Since material from COV reports is used in NSF performance reports, the COV report may be subject to an audit.

ARRA Addendum: Awards funded by the American Recovery and Reinvestment Act (ARRA) were made during the period of time under review by the COV. We have included questions on the template that deal explicitly with this subset of the overall portfolio and the extent to which it met the objectives of the Act and the priorities articulated by the NSF Director. Key information regarding ARRA and NSF priorities as well as optional program-specific priorities will be provided to you.

We encourage COV members to provide comments to NSF on how to improve in all areas, as well as suggestions for the COV process, format, and questions. For past COV reports, please see <http://www.nsf.gov/od/oia/activities/cov/covs.jsp>.

**FY 2010 REPORT TEMPLATE FOR
NSF COMMITTEES OF VISITORS (COVs)**

The table below should be completed by program staff.

Date of COV:
Program/Cluster/Section:
Division:
Directorate:
Number of actions reviewed: Awards: Declinations: Other:
Total number of actions within Program/Cluster/Division during period under review: Awards: Declinations: Other:
Manner in which reviewed actions were selected:

PART A. INTEGRITY AND EFFICIENCY OF THE PROGRAM'S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

A.1 Questions about the quality and effectiveness of the program's use of merit review process. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE ¹
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments: The review process for IF proposals includes some combination of two or more of the following: individual mail reviews, panel reviews, site-visit reviews, and Program Officer reviews. Given the diversity of proposals funded by the IF program, this variety of review mechanisms is appropriate and leads to a well balanced portfolio of activities across EAR disciplines and across the four major categories of IF areas of support: Equipment Acquisition (EA), Instrument and Technique Development (ITD), national multi-user facility (FS), and Technician support (TC), which was converted in 2009 to the Early Career and Technician support (EC) category.</p> <p>The COV examined systematically 85 proposal jackets (see last section for the selection of the proposals reviewed). We discuss mail, panel, site visit and PO reviews separately in the following subsections, with a brief overview below.</p> <p><i>Mail Reviews:</i> The average number of mail reviews continues to be approximately 5 mail reviews per proposal with little variation from year to year. The 2007 COV reported an average number of reviewers as follows: 5.5 (2004), 5.8 (2005), 5.6 (2006). Our findings suggest that the average number of reviewers for the three year period 2007-2009 was: 5.0 (2007), 5.9 (2008) and 4.9 (2009). The lower number in 2009 might be the result of ARRA funds which created an additional reviewing burden to the community not only by NSF but also by other agencies. No substantial difference in the number of reviewers was noted for awarded versus declined proposals (see Table below). Given the approximately 550 proposals handled by IF over the past three years, it is noted that around 2,900 scientists have contributed their expertise to the IF program over that period of time and have evaluated the scientific and broader impact merits of the submitted proposals. This is encouraging, given that most of the individual reviews</p>	<p>Yes</p>

¹ If "Not Applicable" please explain why in the "Comments" section.

continue to be substantive and thoughtful.

Fiscal Year		Awards	Declines	Total
2007	Proposals Reviewed	69	108	177
	Average number of reviewers per proposal	5.19	4.88	5.0
2008	Proposals Reviewed	52	146	198
	Average number of reviewers per proposal	6.12	5.84	5.91
2009	Proposals Reviewed	93	83	176
	Average number of reviewers per proposal	4.88	4.95	4.91
2007-2010	Proposals Reviewed	214	337	551
	Average number of reviewers per proposal	5.28	5.31	5.30
2004-2007	Proposals Reviewed	200	351	551
	Average number of reviewers per proposal	5.7	5.6	5.6
2001-2003	Proposals Reviewed			396

Panel Reviews: Given the very large number of proposals handled by the IF Program, only 50-60 proposals are forwarded for review to each panel meeting. There are two such panel meetings per year and thus approximately 100-120 proposals, out of the approximately 180 to 200 submitted proposals per year, have the benefit of a panel review. It is noted that in the sample we examined, 68% of the proposals in the “gray zone” category (declines with >4.5 overall score and awards with <4 overall score) had the benefit of a panel review. The higher incidence of panel reviews in these gray zone proposals indicates that the criteria used to select proposals for panel review are working well. More discussion on this is given in section A1.4 (panel summaries).

Site visits: The present IF management plan requires at least two site visits to major facilities per year. Given the substantial investment of the IF program in these facilities, the COV encourages that these site visits continue. The site visits are organized in conjunction with an IF panel meeting and this ensures that the diversity of the IF panel membership is brought to bare in evaluating the facility from a broader perspective. The 2007 COV made the recommendation to include a larger fraction of members with management expertise in the site visit and panel review committees and this recommendation was taken to heart and fully addressed by the POs.

Program Officers Review Analysis: The COV continues to be impressed with the thorough PO review analysis leading to a decision, as also reflected in the 2007 COV report. It is clear that the POs consider carefully all reviews (ad hoc and panel reviews) and in addition closely follow their “Guiding Principles” (a document shared with the COV) in reaching a final decision. It is clear that arithmetic scores do not blindly drive decisions (see plots below) and this is to the credit of the POs. However, this puts extra burden on the POs to thoroughly document their decision and communicate it to the PIs, especially in declines with an average score above 4 (approximately 103 proposals in the three year period), and even more so in declines with a score between 4.5 and 5.0 (approximately 50 proposals in the three year period). More on this issue and a recommendation is given in section A1.6 (documentation to the PI).

<table border="1"> <caption>Data from the chart: Number of Proposals Submitted by Average Score and Status</caption> <thead> <tr> <th>Average Score</th> <th>Awarded</th> <th>Declined</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td>5</td> </tr> <tr> <td>2</td> <td>10</td> <td>15</td> </tr> <tr> <td>3</td> <td>25</td> <td>30</td> </tr> <tr> <td>4</td> <td>110</td> <td>60</td> </tr> <tr> <td>5</td> <td>90</td> <td>30</td> </tr> </tbody> </table>	Average Score	Awarded	Declined	1	0	5	2	10	15	3	25	30	4	110	60	5	90	30	
Average Score	Awarded	Declined																	
1	0	5																	
2	10	15																	
3	25	30																	
4	110	60																	
5	90	30																	
<p>2. Are both merit review criteria addressed (in individual reviews, in panel summaries, in Program Officer review analyses)?</p> <p>Comments: As previous COVs have noted, there seems to be no controversy or ambiguity over the interpretation and evaluation of the Intellectual Merit (IM) criterion by PIs, reviewers and panel members. However, some issues continue to exist with the interpretation of the Broader Impacts (BI) criterion. On the average, 20% of the individual reviews did not sufficiently address the BI criterion—a consistent shortcoming among both awards and declines.</p> <p>The 2007 COV commented on the fact that almost every IF proposal matches the broader impacts criterion by definition, given that the NSF-wide BI definition includes “activities to enhance the infrastructure for research and education, such as facilities, instrumentation, networks and partnerships.” Nevertheless, PIs seem to feel compelled to reinvent the wheel in justifying BI activities. On the other side, reviewers receive and interpret these proposed BI activities in non-uniform ways, leading to uncertainty in weighting of this factor in the overall score for the proposal.</p> <p>The COV had a lengthy discussion about the possible value of requiring separate IM and BI scores from reviewers and panelists. Such a requirement would send a clear message to both PIs and reviewers that the BI criterion should be considered seriously, and it would also allow a clear weighting of these two aspects of the proposal in a transparent and consistent way by the POs in making a decision. However, the COV encourages the IF program officers to continue to be flexible in their weighting of the IM and BI criteria. Proposals rated “excellent” on intellectual merit and only “good” on broader impacts might warrant high priority for support. Importantly, the converse is also true. A certain amount of discretion and judgment will be required on the part of the IF POs and panels, as has been true from the inception of the BI “requirement.”</p> <p>The COV noted that an effective way to continue fairness and success in evaluation and balancing the BI and IM criteria is direct communication with the scientific community. For example, showcasing successful BI cases with the same excitement and prominence as cases of research breakthroughs will send a message to the community concerning the importance and value of this aspect of the program’s objectives. The PIs’ consideration of BI could be brought into focus by including specific questions in the proposal solicitation:</p>	<p>Yes</p>																		

<ul style="list-style-type: none"> • What is the level of student and post-doc involvement? • What is the degree to which other potential users in the PI's organization or nearby ones support the request and to what extent do they intend to use the instrumentation requested? • What is the geographic extent of the potential user community? • What is the plan for data archiving and sharing both locally and in open data centers such as EarthChem and the IRIS Data Management Center? • Does there exist sufficient infrastructure for the new instrument to operate at a level that facilitates expansion of the user base? • Does their instrument build on existing infrastructure not necessarily from NSF? • Does the proposal include a well-planned request for supplemental funds for Education and Outreach, including broadening participation to under-represented groups? <p>Recommendation: <i>The BI criterion should continue to be used in the evaluation of every IF proposal, and the COV encourages the IF program officers and panels to remain flexible in their weighting of the intellectual merit (IM) and BI criteria. The best guarantee of fairness in evaluating and balancing IM and BI in the review process is communication with the scientific community re. expectations.</i></p>	
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<p>3. Do the individual reviewers provide substantive comments to explain their assessment of the proposals?</p> <p>Comments: Our sampling of the reviewers' comments on more than 85 proposals showed that in the overwhelming majority of cases the reviewers provided sufficient to extensive analysis of the proposals. It is pleasing to see that despite the ever-increasing load of paper and proposal reviews, the review community takes this responsibility seriously. In several proposals, it was interesting to see that an excellent score of 5 was often accompanied by critical comments by the reviewers which provided a perspective to the POs to guide their final decision.</p>	<p>Yes</p>
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments: Approximately 50% of the IF submitted proposals are forwarded to the panel for review, as discussed in section A1.1. Our sample indicated that for those proposals, the panel summary provided a very useful overview of the individual reviewers' comments and, in all cases we reviewed, the panel was in consensus regarding their recommendation to the POs. This consensus was well justified in the panel report. In a few isolated cases, the panel review was exceedingly short and did not add insight to the individual reviews.</p> <p>From the "gray zone" proposals we reviewed, 68% had the benefit of a panel review. Of these proposals, both the awarded and the declined were well justified in the panel review. However, 32% of the gray-zone proposals were not reviewed by the panel. In that category, declined proposals represent an area for potential improvement in terms of additional documentation of the decision, especially via the PO review analysis and an extensive documentation to the PI. In general, <i>every effort should be made to bring gray-zone proposals to the panel, especially when a declination is the anticipated outcome.</i></p>	<p>Yes (but see comments)</p>

<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>During FY 2009, NSF permitted reversal of a declined decision for funding through ARRA for proposals declined after October 1, 2008.</p> <p>i) Were the reversals of the decision to decline based on both the high quality* of the reviews received on the initial submission and the lack of available funding at the time the origin was made? In general – yes.</p> <p>*Rated "Very Good or above" or the functional equivalent by review panels.</p> <p>ii) Is documentation provided, including a revised Review Analysis, to support the award decisions? Yes.</p> <p>Comments: The jacket documentation includes the individual reviews, panel summary, site visit reports and PO review analysis as well as additional diary notes from telephone or email communication. Taken all together, these review mechanisms provided a well justified rationale for the decision taken regarding the proposal and is well documented in the proposal jacket.</p> <p>There were several proposals with excellent overall mail review score that were declined (see also chart in section A1.1). These proposals need special handling, because feedback to the PIs is critical in encouraging or discouraging further submission. In these positively reviewed but declined proposals, the COV was very satisfied with the Review Analysis by the Program Officers, especially when the review analysis was performed by the IF program officers (Lambert, Kelz and Boyd).</p> <p>Regarding the ARRA funding and the reversal of declined proposals after October 1, 2008, we found that the POs did an excellent job in funding meritorious proposals for which funds were not available during the regular competition, and lack of funding was the basis of the original decline. They are also to be highly commended for their conscious efforts to foster funding of early career faculty and faculty from underrepresented groups using the additional ARRA funding opportunities. In some cases in which the arithmetic scores from the mail reviews were not as high, the reversal of the decision was done appropriately at the discretion of the program officers, who were taking advantage of the “functional equivalent” phrase in the definition of high-quality reviews (see “i” above). The COV applauds this policy.</p>	<p>Yes.</p>
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<p>6. Does the documentation to PI provide the rationale for the award/decline decision?</p> <p>Comments: IF program managers Lambert, Kelz, and recently Boyd provide clear and conscientious justifications for their award/decline decisions both in their review analyses and their communication to the PIs. We found, however, that in a number of declines only a small part of the extensive review analysis was communicated directly to the PIs. Of the gray zone proposals we reviewed, we found 9% which were declined and for which the only reason communicated to the PI for the decision was lack of available funds. Especially for these gray-zone proposals, “lack of available funds” is not an adequate justification to a PI for a decline decision. <i>IF program officers should make every effort to communicate to the PI more concrete, constructive, and if necessary – blunt – justification as to why a gray-zone proposal was not funded.</i> If these reasons include: 1) a lack of previous EAR funding <i>as an indication of comparatively lower potential for future EAR funding</i>; or 2) comparably small number of PIs or individuals who will benefit from the new instrumentation, we see no reason why this information should not be directly communicated to the PI.</p> <p>Of the gray-zone proposals we reviewed, we identified 6% which were declined and for which the review analysis (as well as subsequent communication to PIs) was prepared by someone other than the IF program officers (Lambert, Kelz, Boyd). In these cases, we often found the review analysis and PI communication to be insufficient. <i>Especially in cases of declined gray zone proposals, every effort should be made for the primary IF program officers (Lambert, Kelz, Boyd) to prepare the review analysis and to communicate reasons for the decision to the PI.</i> We note that <i>all</i> of the proposals described above (for which someone other than Lambert, Kelz, or Boyd prepared the review analysis) occurred before 2008 when Boyd was added. The above findings leads the COV to the following recommendation.</p> <p>Recommendation: <i>The rotator position in the IF program (currently filled admirably well by detailee Tom Boyd) should be made permanent. Communications to PIs on particularly sensitive declinations should be written by one of the three program officers.</i></p>	<p>Yes (but see comments)</p>
<p>7. Is the time to decision appropriate?</p> <p>Comments: The average dwell time for <u>all</u> proposals was 8.8 months in 2007, 9.9 months in 2008, and 8.4 months in 2009. It is not entirely clear how these numbers pertain to the “70% in 6 months” requirement. However, given the extensive work load of the POs these turn around times for proposals seem entirely reasonable. The 2007 COV noted that the IF POs are at the “breaking-point” of the number of jackets that can handle. They projected that, as a result, they would not have been surprised if the time to decision was found longer by the 2009 COV. Given that this projection was made in 2007 without anticipating the ARRA awards, the POs are to be highly commended for meeting the desired time to decision despite the increased workload.</p>	<p>Yes</p>

8. Additional Comments

Sampling strategy: From the 551 submitted proposals to the IF program during the period of 2007-2009, the 2010 COV selected a total of 85 proposals for detailed examination. First, proposals in the so-called “gray zone” were selected. This gray zone comprises of declines with >4.5 average score and awards with <4.0 average score. Second, some very highly ranked and some very low ranked proposals were selected at random. Finally, all the major facility proposals (IRIS, UNAVCO, COMPRES, and GSECARS). This subsample included a balanced mix of all four categories funded by the IF program, that is, Equipment Acquisition (EA), Instrument and Technique Development (ITD), National multi-user Facility (FS), and Early Career and Technician Support (EC). The largest investment of the IF program is on FS (74% of total budget), followed by EA (11%), ITD (6%) and EA (6%). The subsample also included several MRI proposals and a random selection of ARRA proposals processed during 2009.

Overall comments: The COV was highly impressed with the POs effectiveness and fairness of using the review procedures in decision making. It is clear that the POs are very knowledgeable about the science of the EAR community, and its major needs, trends and opportunities. They also deeply care about their program, and they have an incredible institutional memory which adds valuable insight in allocating investments to the community. The POs amply demonstrated their innovative thinking and commitment to the program during the ARRA period by handling efficiently and effectively the extra load and making investments in younger scientists that are certain to show their impacts in the years to come. As the number of proposals to the program keep increasing, this diligence may be difficult to maintain with only 2 program officers (this was noted also by the 2007 COV). Also, as extensively discussed above when the number of declines increases so does the pressure to provide blunt and well thought out feedback to the PIs to guide further submissions. This process takes extra time and knowledge and points to the need to add a third program officer to this program.

A.2 Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss areas of concern in the space provided.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE ²
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments: An up-to-date database maintained by the POs contains a record of the scientific profiles of reviewers and panel members that documents their expertise and captures a representative sampling of the numerous subdisciplines that submit to IF. In the evaluation of major facilities, scientific expertise is not the only criterion used in choosing reviewers: here the POs also seek input from directors of other major facilities who bring valuable managerial perspectives. This policy appears to have been initiated mainly in response to recommendations of the 2007 COV, and is regarded by the present COV as a very positive development.</p>	<p>Yes.</p>

² If “Not Applicable” please explain why in the “Comments” section.

<p>0. Did the program use reviewers balanced with respect to characteristics such as geography, type of institution, and underrepresented groups?</p> <p>Comments: The committee found that over the 2007-2009 period, reviewers were selected from every state and a wide variety of institution types. These ranged from a few reviews from 2-year institutions and businesses to many reviewers from MS.- and Ph.D.-granting institutions. It appears that this distribution effectively reflects the distribution of client PI's and therefore is quite reasonable. About 71% of the reviewers chose to not report their gender or minority status, so it is not possible to determine whether the reviewer distribution reflects the gender or minority distribution of the client PI population.</p>	<p>Yes.</p>
<p>3. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments: The COV was unable to discern the existence (or even appearance) of COIs. These were diligently avoided by the POs through judicious choices of reviewers and by strict adherence to rules regarding access by panelists to reviews and discussion of proposals from their own institutions (or from PIs or research groups with whom they have personal or professional connections).</p>	<p>Yes</p>

4. Additional comments on reviewer selection:

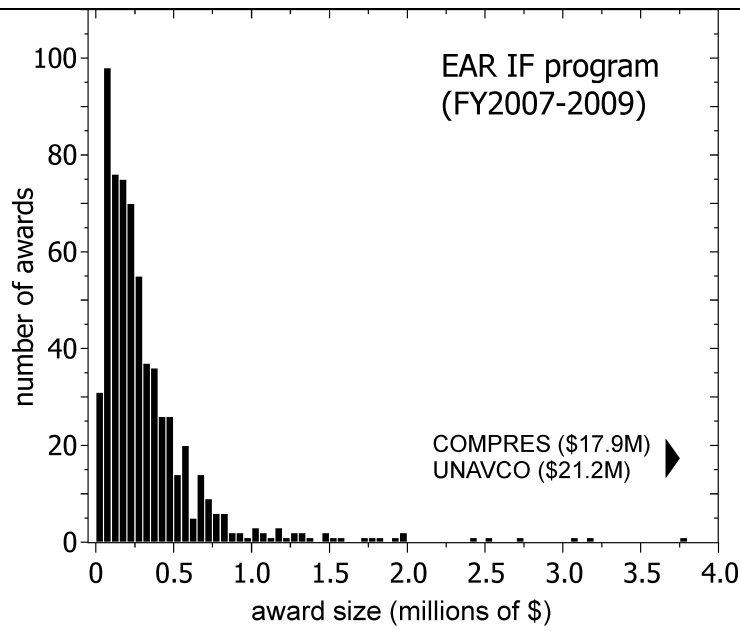
A.3 Questions concerning the resulting portfolio of awards under review. Provide comments in the space below the question. Discuss areas of concern in the space provided.

<p>RESULTING PORTFOLIO OF AWARDS</p>	<p>APPROPRIATE, NOT APPROPRIATE³, OR DATA NOT AVAILABLE</p>
<p>1. Overall quality of the research and/or education projects supported by the program.</p> <p>Comments: The EAR IF program supports an enormous variety of research and educational projects that is remarkable in both its breadth and its overall high quality. At the “big-budget” extreme are large facilities such as IRIS, without which the leading-edge research of numerous scientists around the country and the world would simply not be possible. At the other extreme are small grants to mostly-undergraduate institutions that give students local access to modern instruments and inspire them to careers in science (e.g., upgrade of the electron microprobe at the University of Puerto Rico, Mayaguez).</p>	<p>Yes.</p>

³ If “Not Appropriate” please explain why in the “Comments” section.

<p>2. Does the program portfolio promote the integration of research and education?</p> <p>Comments: A strong positive feature of the IF program is that virtually all of the proposals submitted involve some combination of post-docs, graduate students, or undergraduate students. The purchase of field equipment leads almost invariably to opportunities for students to be involved in data acquisition. Another strong positive feature is that the program officers have set aside resources to support strategic requests for supplemental funds for Education and Outreach, including broadening participation to under-represented groups. This was a proactive response to a recommendation by the 2007 COV.</p>	<p>Yes.</p>
<p>3. Are awards appropriate in size and duration for the scope of the projects?</p> <p>Comments: The award size of the IF program is highly variable because of the extreme variation among proposed projects (see comments and data in answer to A3.6 below). Over the past three years, the average award duration was 1.9 years and the average award size was \$184k. The POs have done a good job of distributing the awards across the range from relatively small instruments costing tens of thousands of dollars to large facilities that cost millions of dollars per year to operate. Within the constraints of the IF budget, the POs do an outstanding job of achieving balance and maximizing impact in EAR research and education.</p>	<p>Yes.</p>
<p>4. Does the overall program portfolio (including ARRA funded awards) have an appropriate balance of innovative/potentially transformative projects?</p> <p>ARRA Specific Question: Does the ARRA funded portfolio have an appropriate balance of innovative/potentially transformative projects?</p> <p>Comments: About 6% of the IF budget is devoted to instrument and technique development. All the projects represented in this 6% could be considered as innovative and potentially transformative projects. Two examples are especially noteworthy: EAR-0116129 involves construction of a device to produce a self-exciting dynamo—as a model for Earth’s magnetic field—in a spinning mass of liquid sodium in a three-meter spherical tank. This is unquestionably a high-risk project, but its success would provide dramatic new insight into the origin and unpredictability of Earth’s magnetic field. A second example is EAR-0922983, which involves seismic instrumentation of the Greenland ice sheet (GLISN), funded through IRIS with ARRA funds [Note that this project also involves a strong international component]. This timely and compelling project will shed unprecedented light on the dynamics of the Greenland ice sheet and its response to climate change.</p> <p>In a broader context, we note that—as a program whose main mission is to fund instruments and infrastructure—the EAR IF program plays at least two key roles in the Earth Science community. One of these is <i>enabling</i> – that is, ensuring that EAR scientists have access to relatively established technologies needed to conduct their research. This role could be thought of as routine, but it is nevertheless absolutely essential, and can lead to unanticipated breakthroughs in the longer term.</p> <p>The other role of the IF program is to support infrastructure that might lead</p>	<p>Yes.</p>

<p>directly to <i>transformative</i> outcomes—that is, relatively high-risk projects that might involve either: 1) construction of new instruments or devices having altogether new capabilities, or 2) deployment of existing instruments in radically new or ambitious ways. These are high-risk ventures that may yield high returns in a short time (see the examples given in the first paragraph).</p> <p>The COV notes that the IF program plays both of the roles admirably well. The large majority of the budget supports the necessary infrastructure for data acquisition (spectrometers, microscopes, sensors, computers, etc.), but the program is also responsive to requests for support of facilities that might transform understanding. The IF program officers achieve a good balance between support of “sustaining” infrastructure and innovative-but-risky projects. A substantial majority of the funds are directed toward sustainment of the data-acquisition infrastructure, but potentially transformative projects are also supported when a compelling case is made.</p>	
<p>5. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Inter- and Multi- disciplinary projects? <p>Comments: A variety of inter- and multidisciplinary projects are funded by IF. As noted below (section A3.13), the POs have been extraordinarily successful in leveraging funding from both within and outside the Geosciences directorate. This amount of co-funding speaks well of the extent of the interdisciplinary and multidisciplinary nature of the funded proposals. For example, of the more than 100 proposals that were co-funded by other programs within NSF, 8 proposals were co-funded by NSF directorates outside of GEO. In addition, many of the funded proposals are collaborative proposals with multiple institutions involved, again speaking to the multidisciplinary aspect of the research, and of course, many of the funded instruments can be and are used by researchers from other disciplines at the home institution.</p>	<p>Yes.</p>
<p>6. Does the program portfolio have an appropriate balance considering, for example, award size, single and multiple investigator awards, or other characteristics as appropriate for the program?</p> <p>Comments: For FY2007-2009, the average award amount in the IF program was \$184K, with a range from a few thousand dollars to ~\$4M (see histogram below). Given an average award duration of just under 2 years, this means that the average annual budget of IF awards is ~\$97K.</p>	<p>Yes.</p>



The overwhelming majority of proposals have multiple investigators, but the scope of instrumentation requested ranges from modest computer facilities, microscopes, etc. for small faculty/student groups to major regional and national facilities involving many investigators at multiple institutions. The COV is of the opinion that the mix represented by the above histogram is highly appropriate for the diverse needs of the EAR research and educational missions.

7. Does the overall program portfolio (including ARRA funded awards) have an appropriate balance of awards to new investigators?

Yes.

Comments: The question as to how well the young scientists fair in competing for funds with more senior scientists is often an issue of concern. This COV performed an analysis of the proposal success rate versus years since PhD and is happy to report that no bias was found (see plots below). This speaks for the quality of the young EAR scientists as well as for the sincere effort of the POs to foster opportunities for early career faculty. During the ARRA competition early career faculty were even more successful than regular years in securing funding from the IF program.

<p>Number of Proposals Submitted</p> <p>Gender</p> <ul style="list-style-type: none"> F M <p>Years Since PhD Conferred</p>	<p>Success Rate (%)</p> <p>Years Since PhD Conferred</p>	
<p>8. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> Geographical distribution of Principal Investigators? <p>Comments: Using a geographic classification in which all organizations located in the Appalachian Mountains eastward were Eastern, all organizations from the Rocky Mountains westward were West, and all organizations in between were Central, the geographic distribution was essentially identical. Of about 600 proposals classified in this fashion, the total range between the highest and lowest number of proposals was 7.</p>	<p>Yes</p>	
<p>9. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> Institutionnel types? <p>Comments: The vast majority of proposals submitted to the IF program between FY2007 and FY2009 were from institutions of higher education (89%). Of all educational institutions, PhD granting universities with intensive research programs submitted most of the higher ed proposals (70%) and had the highest success rate amongst all cohorts (45%). Thus, research universities represent 75% of the IF portfolio for the review period. Over the same time, industrial and intergovernmental agencies fared well in competing against research-intensive PhD institutions (42%), but the remainder of institutional types had significantly less success in obtaining funding (23%) with masters granting institutions receiving funding for only 4 of the 44 proposals submitted. Despite the overall advantage of research universities, the proportion of successful proposals for each institutional type over funding years remained consistent and suggests that there is no systematic bias introduced from changes in budget.</p>	<p>Yes</p>	
<p>10. Does the program portfolio have an appropriate balance:</p> <ul style="list-style-type: none"> Across disciplines and subdisciplines of the activity? <p>Comments: The IF program provides instrumentation and facilities to further</p>	<p>Yes</p>	

<p>research across the full spectrum of subdisciplines supported by the EAR Division, including traditional solid-Earth areas (geophysics, geochemistry, petrology, tectonics, geodynamics) as well as Earth-surface science (e.g., hydrology, aquatic chemistry, element cycling, erosion rates, sensor development). The distribution appears to be determined (appropriately) mainly by proposal “pressure,” and there appears to be no bias in success rate toward one subdiscipline relative to any other. In terms of dollars dispersed, large-budget projects such as COMPRES and IRIS appear to tip the funding balance somewhat toward solid-Earth areas—which probably also reflects historical aspects of the EAR Division. Driven in part by environmental concerns, the center of mass of EAR research has migrated toward the surface in recent decades. <i>It is important for the EAR IF program to continue to strive for balance in supporting projects across the full range of EAR subdisciplines.</i></p>	
<p>11. Does the program portfolio have appropriate participation of underrepresented groups?</p> <p>Comments: The predecessor COV (2007) found that about 35% of the FY 04-06 awards had women PIs and Co-PIs. Statistics for FY 07-09 awards show that the success rate among males and females was not significantly different. The median award to females was lower than that of males (\$144K compared to that of males which was \$217K). This however is the combined result of the lower requests by female PIs (median requested amount of \$200K for females versus \$240K for males) and the fact that not many large multi-user facilities are led by female scientists. The IF POs are to be complemented for their excellent job in balancing gender and age in their investments.</p> <p>The 2007 COV also observed the low level of participation by underrepresented minorities in geosciences. The COV applauds efforts by the IF program officers in giving special consideration and providing support to proposals coming from institutions with high enrollment of Puerto Rican students, as observed in the sample proposals reviewed by the COV. Given that Jackson State University is presently the only HBCU with an Earth Sciences program, it is understandable that there are currently no IF requests from HBCUs. However, under representation by minority groups still remains a significant problem that needs special attention across all the NSF geosciences programs.</p> <p><i>In order to proactively increase the participation of underrepresented groups in EAR research, the COV encourages the IF POs to establish a mechanism for providing special supplements to PIs (possibly not minority themselves) who work with minority students, such as in Minority Serving Institutions (MSIs). On a broader scale, the COV recommends that special efforts be made and some mechanism be established across the geosciences programs to encourage and assist HBCUs in establishing geosciences programs in their institutions to enable the training of geosciences minority students.</i></p>	<p>Yes</p>
<p>12. Is the program relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports.</p> <p>Comments: The EAR division supports a wide variety of research that is of central importance to U.S. national priorities on matters related to climate change,</p>	<p>Yes</p>

environment, and natural hazards. This includes, but is not limited to, studies of past climates as they might inform present and future trends. It also includes “real-time” investigations of ground- and surface waters, watersheds, erosion, nutrient cycling, biodegradation and microbial activity as these affect soil and water chemistry. The IF program supports all these EAR endeavors by funding instruments and facilities for the study of the chemical and physical aspects of all these systems, and creating models to predict future patterns. In addition, the program is responsive to time-sensitive and urgent instrumentation needs through the RAPID proposal mechanism, as in the case of the massive earthquake in Chile last spring.

Inasmuch as NSF’s mission includes “[*advancement of*] *the national health, prosperity, and welfare (NSF Act of 1950)...*”, the IF program is central to the agency mission because of its key role in providing the infrastructure needed for effective monitoring and stewardship of our environment and protection of our citizens from natural hazards. The IF Program is also highly responsive to the research and education challenges posed in the recent GEO Vision report, which calls for “fostering a sustainable future via understanding of our complex and changing planet.”

13. Additional comments on the quality of the projects or the balance of the overall portfolio (including ARRA funded awards).

ARRA Funding

The 2009 ARRA funds created remarkable new opportunities for the IF program. The base budget of \$30.65M was augmented by \$15.65 M (\$7.65M ARRA and \$8M Offset), and the MRI program brought another \$3.2M from ARRA funds (in addition to the base MRI funds of \$3.2 M). The new competition of MRI-R2 brought an additional \$5M (August 2009 competition) and the ARI-R2 competition brought in a further \$11.8M (carried over to 2010). The overall impact on the IF budget was essentially a doubling of available funds for FY2009.

The COV reviewed several ARRA-funded proposals and was impressed with the creativity of the POs in distributing funds to reach a broad community of researchers. The most meritorious research was supported, while at the same time increasing opportunities for integration of research and education activities and promoting funding for early career faculty and underrepresented groups. The e-jackets revealed a diligent process of external reviews, panel reviews, analysis review and communication to the PIs despite an overload during the 2009 year of ARRA.

Interagency Funding Partnerships

The IF Program has enhanced and extended its ability to fund earth science infrastructure through significant interagency funding partnerships. DOE, NASA, and USGS are all significant partners in some of the IF program’s largest and most visible facilities. Notable examples include funding of IRIS (with co-funding from both DOE and USGS as well as other agencies and NSF-programs), UNAVCO (with co-funding from NASA), and GSECARS (with co-funding from DOE), which is a synchrotron-based research facility at the Advanced Photon Source in Argonne, IL.

Intra-agency Funding Partnerships

The IF program has made good use of co-funding opportunities with other NSF divisions and directorates. Over the 2007-2009 award period, 53 proposals were co-funded by other NSF-EAR divisions, 29 were co-funded by OPP, 21 were co-funded by EAR-OCE, and 8 co-funded by other NSF directorates. Perhaps of note is that no proposals were co-funded by EAR-AGS (formerly ATM). This is sharp contrast to the large co-funding coming from the two other GEO divisions (EAR and OCE). Given the current emphasis on looking at

Earth as a system, this is a little surprising. A possible reason is that NCAR supports several community facilities for the upper atmosphere such as HIAPER, etc.

International Partnerships & Collaborations

During the three year award period under review, we find ~54 funded proposals that include a significant international collaborative component (i.e., international research partners). In addition, notable instrumentation development projects such as GLISN (Greenland Ice Sheet Monitoring Network) include important international partnerships. In the case of GLISN, the partnership is with the Geological Survey of Denmark and Greenland. Also, the Global Seismic Network that is operated by IRIS involves extensive international collaboration. In addition, the field equipment purchased by IF grants and via funding to facilities such as IRIS and UNAVCO results in many international collaborative projects each year.

The COV applauds the IF POs for their proactive approach to leveraging the program's resources and encourages them to continue seeking creative opportunities for co-funding with other agencies, other NSF programs and divisions, and with international groups and agencies in order to expand the IF program's reach and maximize its visibility.

A.4 Management of the program under review. Please comment on:

1. Management of the program.

Comments: The management of the EAR/IF program has been outstanding during the period under review (FY07-09). The program officers have done their jobs with vision and purpose, and succeeded admirably in distributing the ARRA funds of 2009 even during a time of obvious overload in the number of proposals processed.

In order to assure the continued high quality of IF management and service to the community, the COV firmly believes that the position of the third IF program officer (currently Tom Boyd) should be made permanent. Based on our analysis of feedback provided to PIs of declined proposals before and after addition of Tom Boyd, his presence clearly helped to more consistently produce high-quality review analyses and PI communications. Especially in cases of declined gray zone proposals, three POs are needed to address our concern that every effort should be made for the primary IF program officers to prepare more concrete, constructive, and candid justification for the decision to the PI. In addition, this addition of personnel would make it possible to better document declinations that occur without panel review. For additional documentation and thinking on this point, the reader is referred to sections A.1.1 and A.1.4-A.1.6.

2. Responsiveness of the program to emerging research and education opportunities.

Comments: This topic was largely addressed in section A.3.4 in response to questions concerning innovative and potentially transformative research. The COV was very impressed at the responsiveness of the program not only through expected mechanisms (e.g., RAPID grants), but also in terms of the perceptiveness of the program officers and their panels in recognizing innovation in both research and education. The new GEO Vision report, with its emphasis on understanding earth's complexities for a sustainable future, is very timely in guiding future investments of the IF program.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

Comments: The POs shared with the COV their “Guiding Principles” document which spells out the philosophy of investments, and especially prioritization in times of shrinking resources. These principles make clear that “new starts” for example are given priority if leverage from other sources is available (co-funding with other NSF programs, NASA, DOE, etc), are considered in view of any “queue” that might have been built by the community, and are important programmatically to foster new areas of research, early career faculty and minorities. Also, during constrained budgetary times, facility funding for maintenance is a priority to avoid irreversible loss of capabilities.

4. Responsiveness of program to previous COV comments and recommendations.

Comments: Although the 2007 IF COV’s overall assessment of the IF program was highly favorable, the panel made several suggestions for improving the effectiveness of the program. All of these suggestions have been acted upon and the 2010 COV have identified the following actions as especially effective. The suggestions and actions are summarized as follows:

2007 suggestion: *The Instrumentation and Facilities POs should partner with PIs to communicate more effectively to the lay public the excitement and impact of our science, and to the scientific community in terms of Broader Impacts.*

Action: The PI’s are now allowed to budget up to \$20,000 to engage the public and communicate their findings to the lay public.

2007 suggestion: *EAR should perform a more comprehensive evaluation of the management of large facilities.*

Action: A review of IRIS facility management was completed in April 2009 and a review of all IRIS business systems was conducted by the NSF Large Facilities Office in fall 2009. In addition, the panel and mail reviews usually provide a significant evaluation of project management plans.

2007 suggestion: *a uniform policy on cost-sharing is needed.*

Response: The cost sharing policy is enforced from a higher management level. It appears that the POs do, however, have a very clear idea about how they would implement a cost sharing requirement.

2007 suggestion: *The Broader Impacts evaluation criterion should be considered more comprehensively.*

Response: This situation has continued to improve. The BIs of the proposals are now, in most cases, evaluated by the mail and panel reviews and these evaluations are carefully considered by the PO’s in their analysis of the award.

Two final suggestions of 2007 report: *1. Engage more panel review members from the community; and 2. Develop a mechanism by which PI’s final reports could be exported into a database.*

Response: These two suggestions involve actions that are beyond the PO’s authority or responsibility.

5. Additional comments on program management:

In their introductory remarks to the COV, Assistant Director Tim Killeen and Division Director Bob Detrick requested that we address three specific issues along with our general evaluation of the IF program: *broader impacts*, *cost-sharing* and *mid-size infrastructure* (the first two of which were also topics of concern to the 2007 COV). The views of the present COV on broader impacts are summarized in section A.1.2, but cost sharing and mid-size infrastructure have not been explicitly addressed up to this point. These are discussed below.

Cost-sharing

The 2007 IF COV expressed concerns that the removal of required institutional cost sharing substantially decreased the expendable dollars for the IF program and caused a decrease in the overall success rate of proposals. The present COV concurs with that finding, on the basis of a present average proposal success rate of ~35% as compared ~50% in the pre-2005 time frame. We believe that reinstating a cost sharing requirement would produce a number of benefits, including a general increase in the amount of science that IF can support. More importantly, however, it would reestablish the incentive for administrative buy-in and sustainability of instruments and facilities on U.S. campuses. In the final analysis, the elimination of cost sharing in 2005 appears to have provided advantages to the rich universities, with little evidence that the poor universities gained very much. Reinstatement of the cost sharing requirement for permanent equipment would provide several tangible benefits to the NSF as well as their client scientists. The most workable simple model would parallel that of the MRI program: 30% cost-sharing mandatory (equipment only) for PhD-granting institutions; no cost-sharing for non-PhD granting universities and colleges. [Note: A minority of the COV believes that this model is too simplistic because the ability to engage in cost sharing varies dramatically among PhD-granting institutions, private and public alike. Requirement of a fixed 30% would discriminate against geoscience programs at less wealthy universities whose administrations favor other fields. It would also put HBCUs in more direct competition with wealthy liberal arts colleges having endowment/student ratios higher than many PhD-granting institutions.]

Recommendation: *Given that the cost-sharing policy is set at the highest administrative level of the NSF, the COV recommends that the IF program officers prepare a proposal to reinstate a cost sharing requirement for equipment line items in IF proposals. A simple model following that of the MRI program would be desirable (but see more detailed discussion in section A4.5).*

Mid-size Infrastructure

Currently the Major Research Instrumentation (MRI) funds equipment acquisition and instrumental development with minimum capital cost of \$100K and maximum of \$4M, while the Major Research Instrumentation and Facility Construction program funds larger GEO projects having a minimum cost of \$100M. These designated funding ranges create a no-man's-land land between \$4M and \$100M, which is a range where the COV anticipates significant need and interest in future years.

The IF COV was presented with compelling examples of EAR community needs for which the capital cost falls within the "mid-size infrastructure" range, and for which there is currently no funding mechanism. The National Science Board (NSB) estimates, furthermore, that about 50% of infrastructure need is in the \$1M- \$50M range. Such a gap in the funding of research infrastructure and facilities does not fit with the IF mission of fostering the acquisition, development and access to a wide range of GEO research and educational tools and to the overall NSF strategic goal of enabling infrastructure and facilities for research and education. The gap also discourages forward-looking strategies designed to identify and plan for the next generation of large research facilities.

Recommendation: *The COV recommends that the IF program officers submit a proposal to the NSF to establish a program for the support of meritorious projects falling in the "mid-size infrastructure" range. This might be accomplished in the short term by raising the cap on MRI proposals to \$10M or \$20M.*

PART B. RESULTS OF NSF INVESTMENTS

The NSF mission is to promote the progress of science; advance national health, prosperity, and welfare; and secure the national defense (NSF Act of 1950).

In this Section, the COV is asked to comment on (1) noteworthy achievements based on NSF awards in the portfolio under discussion; (2) ways in which funded projects have collectively affected progress toward NSF's mission and the strategic outcome goals of Discovery, Learning, and Research Infrastructure; and (3) expectations for future performance based on the current set of awards.

NSF investments produce results that appear over time. Consequently, the COV review may include consideration of significant impacts and advances that have developed since the previous COV review and are demonstrably linked to NSF investments, regardless of when the investments were made.

In addition to identifying particularly noteworthy accomplishments or "highlights," the COV is encouraged to comment on the impact of NSF supported contributions to the field. For example, the COV report may include comments on NSF supported work in context of contributions to advance a field, impact of NSF investments to stimulate emerging new areas, and potential for transformative impact in research or education.

To assist the COV, NSF staff will provide award "highlights" as well as information about the program and its award portfolio. The COV is asked to use this information, members' own knowledge of the field, and other appropriate information to develop its comments for this section.

B. Please provide comments on the activity as it relates to NSF's Strategic Outcome Goals. Provide examples of outcomes ("highlights") as appropriate. Examples should reference the NSF award number, the Principal Investigator(s) names, and their institutions.

B.1 OUTCOME GOAL for Discovery: *"Foster research that will advance the frontier of knowledge, emphasizing areas of greatest opportunity and potential benefit and establishing the nation as a global leader in fundamental and transformational science and engineering."*

This category includes NSF's disciplinary and interdisciplinary research in science and engineering, education research, and centers.

Comments: The COV is impressed with all the work being accomplished by researchers supported fully or in part by EAR/IF. As recognized by the previous COV, numerous discoveries have been reported in leading scientific journals, such as *Science* and *Nature*. This work has spanned areas of research from across the EAR directorate, and has addressed such areas as understanding present and past global climate change to natural hazards to breakthroughs in understanding evolutionary linkages.

The 2010 COV also noted many examples of the outstanding work made possible by EAR/IF funds. One particularly high-profile example are the studies by Schwietzer (EAR 0548847) and Asara (EAR 0722702) and co-workers, who discovered that soft tissue in the form of proteinaceous material is preserved in bones of Cretaceous (80 million year old) dinosaurs. Extraction and analysis of this material enabled linkages to modern birds. An exciting result in solid-earth science is that from the CALIPSO Borehole Observatory, Soufriere Hills Volcano, Montserrat (Mattioli EAR 0732728) on andesitic magma dynamics. This work confirmed the presence of two magma chambers (one deep and one shallow) beneath the active Soufriere Hills Volcano, which will have implications for not only understanding earth structure, but also for understanding

volcanic hazards at Montserrat. Also, new sensors to monitor the environment, such as stream temperature sensors and portable radars, are making new discoveries related to the response of the upper atmosphere and the earth's surface to changing climatic and environmental conditions.

While the COV recognizes the significance of publishing in *Science* and *Nature*, we note that many of the results from funded projects (including those that are significant and very high impact) are published in other journals and publications. In order to 'go beyond *Nature* and *Science*' in measuring the significance and high impact of IF-funded science, the COV recommends that the POs invite the scientific community to help create a database of the top 10 cited journal papers of each funded project. This would also allow for the possibility of tracking the impact of funded projects beyond their lifetime of funding.

Recommendation: *The COV suggests that the program officers ask all PIs in the program to submit a list of their top 10 most heavily cited publications arising from IF-enabled research, and to describe in layman's terms "What we know today that we did not know 10 years ago." These contributions could then be compiled and perhaps made available at the NSF web site.*

B.2 OUTCOME GOAL for Learning: "Cultivate a world-class, broadly inclusive science and engineering workforce, and expand the scientific literacy of all citizens."

This category includes K-12, undergraduate, graduate, and postdoctoral education and training; public understanding of science; and lifelong learning.

Comments: Projects such as IRIS and UNAVCO have extensive and effective Educational and Outreach initiatives that range from materials and curricula for K-12 teachers and students, to internships for undergraduate students, to graduate student education and outreach to the general public. These programs also address scientific literacy via electronic media and hands-on museum displays.

The portable equipment provided via these facilities is deployed around the world by a combination of post-docs and graduate- and undergraduate students. These activities provide not only scientific enrichment but also opportunities to experience other cultures and meet international colleagues.

To a considerable extent, all IF instrument grants should have strong broader impacts by definition because the instruments and laboratory facilities should be used by many students and colleagues in the scientific community. A strong positive feature of this program is that virtually all of the proposals submitted involve experiences for some combination of post-docs and students at all levels. The purchase of field equipment almost invariably leads to opportunities for students to participate in data acquisition. Another strong positive feature is that the program officers have set aside resources to support well-planned request for supplemental funds for Education and Outreach including broadening participation to under-represented groups.

B.3 OUTCOME GOAL for Research Infrastructure: "Build the nation's research capability through critical investments in advanced instrumentation, facilities, cyberinfrastructure and experimental tools."

This category includes facilities, research instrumentation, and cyberinfrastructure.

Comments: EAR/IF has played a critical role in supporting EAR research across the nation and world-wide. Funding of equipment, instrument development, and large multi-user facilities is necessary for the maintenance and long-term research capabilities in the earth sciences. The COV praises the POs for their ability to effectively manage the IF program and maintain a continual flow of research tools to the earth science research community. We further commend the POs for broadening the scope of their funding impact by the exceptional amount of leverage, both within NSF and with other federal funding agencies, that they have been able to accomplish. Detailed examples are discussed in section A3.13.

PART C. OTHER TOPICS

C.1. Please comment on any program areas in need of improvement or gaps (if any) within program areas.

C.2. Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

C.3. Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

Please see recommendations on the issues of cost-sharing and broader impacts, which are both NSF-wide issues.

C.4. Please provide comments on any other issues the COV feels are relevant.

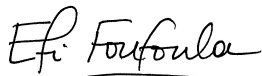
C.5. NSF would appreciate your comments on how to improve the COV review process, format and report template.

The IF program officers, Division Director and Assistant Director of NSF for Geosciences were extremely helpful both prior to and during the COV. The only suggestions we have for management of future COVs are the following:

1. Provide access to relevant materials further in advance of the meeting at NSF (say, ~2 weeks).
2. Keep access to the COV module open to committee members—or at least to the chair(s)—for the intervening period between the meeting at NSF and the due date of the report is due (Note: this was done at the chairs' request this year).
3. Provide an additional week or two for report preparation.
4. Allow the COV chair(s) to determine the format of the report. The current format requires placement of answers to specific questions in the boxes of a pre-formatted MSWord table. This was sometimes cumbersome, especially because of perceived overlap and some redundancy in the questions.

Respectfully submitted,

Efi Foufoula-Georgiou



and

E. Bruce Watson



Co-chairs, 2010 EAR Instrumentation and Facilities C.O.V.

August 11, 2010