Staff Response
To the Committee of Visitors (COV) Report
Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP)
COV Meeting of January 19-20, 2006

On January 19-20, 2006, a Committee of Visitors was convened to review the years FY 2002 –2005 of the Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP). The program staff thanks the COV members for their thorough review of the program and helpful suggestions. The response here addresses the comments and issues that were included in the COV report. Responses are organized in accordance with the order provided by the FY 2006 Report Template for NSF Committees of Visitors.

Part A. Integrity and Efficiency of the Program's Processes and Management

A.2.4 Regarding the implementation of NSF merit review criteria, the COV commented: "Based on our consideration of the use of the two merit criteria in the three different levels of reviews [individual reviews, panel summaries, review analyses], we believe the following issues should be mentioned: These two criteria seem to have been introduced with one type of grant proposal in mind and are being used here to evaluate a very different type of proposal in the STEP program. In a traditional grant for a scientific discipline, a primary goal might be to "advance knowledge." A secondary goal would be to promote "teaching, training and learning." For a Type 1 STEP grant, the primary goal is to promote "teaching, training, and learning," an activity that in the current taxonomy falls squarely under "broader impacts." As a result, reviewers and panels seemed to be unsure about how to apply the broad "intellectual merit" criterion to this kind of proposal….More guidance for reviewers and panels about how to apply these criteria and where in a review to put different parts of the discussion might be useful."

Response: Program staff appreciates the COV's analysis of the difficult situation facing those who review proposals within STEP since the NSF-wide distinctions between Intellectual Merit and Broader Impact do not translate well to STEP. We have included suggestions to the reviewers for topics which might best be included under Intellectual Merit and those that might well be discussed under Broader Impact. These suggestions are sent to the reviewers when we send them instructions for reviewing and their lists of proposals to review, and the suggestions are repeated at the Orientation Session at the start of the on-site panel meeting. However, we do know that many of our STEP panelists routinely review for other programs at NSF, so they often have difficulty adapting to our suggestions. Nevertheless, we will continue to offer suggestions, and to reinforce these suggestions throughout the on-site panel meeting.

A.3.3 Concerning the selection of reviewers, the COV commented: "We examined the characteristics of 318 reviewers, not all of whom were unique. Reviewers were from a variety of geographic regions of the U.S. including 43 different states and the Virgin Islands and Puerto Rico. By self-report, reviewers were from a variety of types of institutions including two-year colleges (51), doctoral institutions (128), masters

institutions (81), baccalaureate institutions (40), industry (5) and other (5). Forty-seven reported that they were minority, 2 reported that they had disabilities, and 122 reported that they were female. The program would benefit from including individuals from two-year colleges panel [sic] in order to provide a better balance since many of the proposals involve partnerships between two-year and four-year colleges as well as between high schools and colleges. The programs that involve collaboration with community colleges should have two community college reviewers on it. Some of the panels that were examined did not have as much geographic diversity as might be desirable."

Response: Program staff agrees that, as the COV notes, STEP uses appreciable numbers of reviewers from each of two-year, four-year, masters, and doctoral institutions. We group proposals on panels according to the type of institution that submits the proposal. We attempt to have on every panel reviewers representing two-year, four-year, masters, and doctoral institutions, reviewers representing at least four different disciplines, reviewers balanced for gender and for members from underrepresented groups, and reviewers having geographic diversity. In addition, we enrich each panel with a second reviewer from the type of institution represented by the proposals on the panel. We will continue to attempt to secure a pool of reviewers for which all of the appropriate factors are well-represented in the overall pool, although achieving a broad balance of all of the factors within every individual panel of 5-6 reviewers may not always be possible.

A.3.5 Concerning the selection of reviewers, the COV commented: "Reviewers should be encouraged to provide more thorough reviews that highlight the strengths and provide concrete suggestions when possible to overcome weaknesses."

Response: Program staff appreciates the earlier comments of the COV in Sections A.1.1, A.1.3, and A.1.7 where the COV notes: "It is our opinion that review panels were appropriate for the Type 1 proposals since these panels provided good input to NSF program staff from professionals in the field, ensured a diversity of expert opinion on the various aspects of the proposals, and permitted the program staff to benefit from the on-the-ground experiences of practitioners." And "Based on reading more than twenty individual reviews, it is our opinion that the preponderance of the reviews do provide sufficient information to allow the principal investigator to understand the basis for the reviewer's recommendation." And "A review of the jackets leads us to conclude that the quality of reviews has improved over time. Reviewers appear to be more knowledgeable and understanding of the program goals and objectives and individual reviewers have provided more detailed and useful comments." We agree with the COV that the quality of reviews has improved over time, and we will continue to encourage more thorough reviews as the COV recommends. At the same time, we do want to continue to include new reviewers in the pool of panelists since this is an effective mechanism for introducing a broader range of faculty and institutions to STEP, and for allowing faculty to see for themselves what makes a strong STEP proposal and strong STEP project. However, including new reviewers does run the risk that the reviews from those new reviewers will be less thorough while these faculty are working to master the practice of reviewing.

A.4.8 Concerning the resulting portfolio of awards under review, the COV commented, in answer to a question about whether the program portfolio has an appropriate balance of

institutional types, "Of the twenty projects we reviewed, nine were from research 1 institutions, eight were from 4-year colleges or universities and three were from 2-year colleges. Given the number of 4-year and 2-year institutions in the country compared to the number of research 1 institutions, it is our opinion that the program might want to seek methodologies that will increase awardee representation from among the former group of institutions."

Response: Program staff notes that the distribution of the twenty awards cited (selected at random according to a formula based on the award number) does not reflect the overall portfolio composition. However, awards to doctoral institutions do dominate the portfolio. Awards made directly to 2-year institutions represent about 20-25% of the portfolio, and these distributions follow the distributions of the proposals submitted. However, it is important to note that many 2-year institutions are represented as partners on awards to other types of institutions. For example, in FY2005, of 24 Type 1 STEP awards, although 12 went to doctoral institutions, four to masters institutions, four to 4-year institutions, and four to 2-year institutions, an additional fourteen 2-year institutions were partners on awards made to non-2-year institutions. Since the existing rate is very low for STEM students in 2-year institutions transferring to obtain four-year STEM degrees, we believe that these partnerships between 2-year and non-2-year institutions represent an important priority for STEP.

A.5.1, A.5.4 Concerning the management of the program, the COV makes a number of suggestions, including the use of specific management tools, throughout Section A.5 for assuring continuous improvement of the management of STEP.

Response: Program staff appreciates the comments of the COV noting that STEP is well-managed. "Based on these items, we determined management of the program is effective and efficient." "The STEP Management Plan gives a good top-line overview and serves as a basis for continuous improvement." "We feel the NSF staff is effective in managing this program." Program staff will continue to follow NSF required policies and practices for managing STEP and other programs, and individual NSF staff will continue to make use of the NSF and Federal training opportunities for continuous development of their personal skills. The COV suggests some specific management tools that might be used by the NSF. This suggestion was taken by the Division Director for further discussion at the Directorate level.

Part B. Results of NSF Investments

B.2 Regarding Outcome Goal for Ideas, the COV recommends "continued operation of and possible expansion of the research and scholarly component of STEP."

Response: Program staff agrees with the recommendation that the STEP Type 2 option be continued. We expect to expand this option in line with any increases in the overall STEP budget.

Part C. Other Topics

C.4.1 Concerning whether the existing funding levels appear to allow for a reasonable mix of projects of the appropriate scope at a good mix of institutions, the COV suggests that, "if funding to the STEP program were to expand significantly, in addition to funding more PIs who write to the current program goals, STEP might want to consider soliciting projects that require more than two million dollars for full implementation. Such projects could, for instance, be ambitious, institution-wide projects located at some of the country's very largest universities, multi-institutional collaborations among universities in an entire state or large urban region, or projects involving extensive data collection."

Response: Program staff agrees that this would be an appropriate option to consider should funding of STEP increase significantly.

C.4.2 Regarding whether projects might be sufficiently significant under lower funding levels, the COV describes a case and suggests that the cost per student would be higher than the nominal average for STEP awards, and then further suggests that STEP encourage proposals of smaller scope.

Response: Program staff notes that the case described, in which an institution increases its number of STEM graduates by 20 per year with a five-year project budget of $500 K, in fact does conform to the nominal average for STEP awards. The cost per additional graduate per year would be about $1250 ($100 K for each set of 20 students, each student supported for 4 years), not out of line for STEP projects. Since STEP is responsible for producing increases in the number of STEM graduates at institutions, and since we have finite staff and resources available at NSF for managing STEP, we do not believe that it is a good use of NSF resources to encourage projects of smaller scale than those now solicited.

C.4.3 Concerning the opportunities that should exist for seeking an additional grant by projects that have reached the end of their 5-year grant periods, the COV suggests several circumstances that might warrant continued funding.

Response: Program staff appreciates these comments and will consider them as we begin discussions of this issue this spring. The first round of implementation grants, those funded in FY2003, are just reaching the stage where we will need to provide in the next Program Solicitation guidance to them about resubmissions.

C.4.4 Concerning the quantitative metrics that have been developed to manage the program, the COV "hopes that the foundation will continue to track this number [the incremental investment per additional STEM major] and update it as information comes in about what institutions actually do, not just what they promise. Presumably, this will be an important part of the mandate for ORC."

Response: Program staff notes that the data being collected by ORC Macro will allow for updates of this number based on actual performance by the projects.

C.4.4 Concerning the use of the number found for the incremental investment per additional STEM major, the COV agrees that this number should not be publicized nor highlighted in the request for proposals, but "does believe that it might be helpful for proposers to be told that cost effectiveness in this sense is one of the criteria used to evaluate proposals and that the program officers could experiment with telling reviewers the range of values for accepted proposals so that they have a benchmark for evaluating the proposal assigned to each of them."

Response: Program staff agrees that the number should not be publicized nor put in the request for proposals. Cost effectiveness is only one of many criteria that we find important for reviewers to consider, so we will not ask reviewers to put special emphasis on this factor. The NSF policy requires that reviews be based on information in the Program Solicitation, thus precluding our supplying benchmark values to the reviewers if we have not put these in the Program Solicitation for the benefit of the applicants. At the more mundane level, if we were to provide the number to the reviewers, all of whom are themselves members of the larger academic community, in reality this number would rapidly be publicly known as an important criterion in the review of STEP proposals.

C.4.4 and C.4.5 Concerning the use of intermediate indicators in the quantitative measures being used to manage STEP, the COV suggests that "the program officers work with ORC and the various PIs to work toward a set of intermediate indicators. If there were some consistency of these indicators across programs, it would clearly help the foundation and scholars interested in these interventions to evaluate how they work. One forum where these might be discussed might be the annual meeting of the PIs." And "A second suggestion from the Committee is that ORC collect data on leading and lagging indicators that correlate to the desired outcomes of STEP, i.e. 'increases in STEM degrees earned'."

Response: Program staff agrees that intermediate indicators are extremely important in tracking the likely increases in STEM majors. The full monitoring survey was not available to the COV at the time of their meeting, but the survey includes an item asking institutions to give their numbers of declared majors in each STEM field each year as an intermediate indicator. This item was piloted tested earlier on a subset of STEP PIs in order to determine the feasibility of their providing such data, and in order to obtain their feedback on the usefulness to them of the measure.

C.4.5 Concerning the suggestion by the COV that the survey form used in the evaluation contract contain opportunities to list a much wider variety of science majors than those shown.

Response: Program staff notes that the actual on-line survey form (not available at that time to the COV members) gives respondents access to hundreds of possible majors in STEM, including the examples cited by the COV.

C.4.6 Concerning the best utilization of the peer review system to make decisions on an implementation program, see the comments and response under A.3.5 under Part A.