REVIEW OF THE OFFICE OF RESEARCH AND DEVELOPMENT'S SCIENCE TO ACHIEVE RESULTS (STAR) AND GREATER RESEARCH OPPORTUNITIES (GRO) FELLOWSHIP PROGRAMS AT THE U.S. ENVIRONMENTAL PROTECTION AGENCY

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I. SUMMARY

I.1 Background and Charge to the Subcommittee

The U.S. Environmental Protection Agency (EPA) funds three academic fellowship programs to help maintain the expertise of its own research programs and that of other entities with responsibility for environmental protection: (1) the Science To Achieve Results (STAR) Graduate Fellowship Program; (2) the Greater Research Opportunities (GRO) Fellowships for Graduate Environmental Study Program; and (3) the GRO Undergraduate Fellowships for Environmental Study Program. EPA's intended outcome of the STAR Fellowship Program is to encourage promising students to obtain advanced degrees and pursue careers in environmentally related fields. In contrast, the goal of the GRO Fellowship programs is to build capacity for environmental research at schools and universities receiving limited funds, by providing funding to individuals. All three fellowship programs are administered by EPA's National Center for Environmental Research (NCER). Applications are reviewed by NCER with the assistance of volunteers from throughout EPA and by peer reviewers recruited from outside the Agency.

In June 2005, the EPA Board of Scientific Counselors (BOSC) Executive Committee agreed to conduct a review of the STAR and GRO fellowship programs, which was carried out by a Subcommittee of the BOSC. The charge to the Subcommittee consisted of three specific questions addressing whether the respective programs were achieving the outcomes stated above, and four general questions concerning the fellowship recipient selection process and decision criteria; the utility of the fellows' research to EPA and others for decision-making and policy; practices, resources, and effectiveness of outreach; and resources, information management, and communication processes and procedures. Appendix A contains the complete charge to the STAR/GRO Fellowships Subcommittee. A list of the Subcommittee members is provided in Appendix B.

I.2 Findings and Recommendations

This section summarizes the Subcommittee's general findings and recommendations, followed by those specific to the three individual programs.

I.2.1 General

Overall, the Subcommittee finds that the fellows funded by the STAR and GRO programs have made excellent contributions in environmental science and engineering, and a number of them continue to be employed in the environmental field in academia, consulting, and government (EPA and other agencies). Although other federal agencies fund a number of fellowship programs, none are dedicated exclusively to the environmental sciences and engineering.

Therefore, the EPA programs clearly are of value to the Agency and the nation in helping to educate the next generation of environmental scientists and engineers.

This conclusion is based on extensive, but primarily anecdotal, data regarding program outcomes that EPA provided to the Subcommittee. During much of the duration of the current programs and their immediate predecessors, there was little systematic effort to collect data needed to fully evaluate program outcomes, such as career paths and publishing records of fellows. In recent years, EPA has responded to the need for such information by establishing a Fellowship Information Inventory (FII). This effort is commendable, but has limitations based on its derivation from a system originally not intended for that purpose.

The Subcommittee recommends that EPA take several steps to improve its program data collection and hence its ability to evaluate outcomes:

- ✧ **Develop an overall information collection strategy, which includes design of an appropriate database.**

- ✧ **Require fellows to submit an up-to-date resume annually for at least 5 years from the conclusion of the fellowship.**

- ✧ **Require universities with fellowship recipients to provide the basic initial information for the database at the conclusion of the 2-or 3-year fellowship period.**

The STAR and GRO fellowship programs have different stated purposes and different funding levels, which directly affected the Subcommittee's findings and recommendations. The STAR Fellowship Program funds about 100 fellowships per year with an annual budget of approximately $10 million. By contrast, the GRO Graduate Fellowship Program funds about 15 fellowships per year with an annual budget of $1.5 million, and the GRO Undergraduate Fellowship Program funds 15 fellowships per year with a budget of $650,000. The Subcommittee finds that, with the caveat above about data availability, the STAR Program appears to be achieving its intended outcome of encouraging promising students to obtain advanced degrees and pursue careers in an environmental field.

The two GRO Fellowship programs are intended to build capacity for environmental research at schools and universities receiving limited federal research and development funds, based on the premise that this outcome will be achieved by funding individual fellows. The Subcommittee finds that the resources allocated, which are widely spread across institutions, are insufficient for the purpose of capacity building. Fifteen fellowships annually, awarded to students at institutions from across the country, are simply not enough to have a significant impact at specific institutions. Further, there is limited competition for the awards in the undergraduate program (a success rate of approximately 33%, compared to 6-7% for the graduate program, similar to that of STAR), and EPA's redefinition of the GRO Fellowship programs away from explicitly targeting underrepresented groups to schools receiving limited federal funds has meant that a substantial number of fellowships have been awarded to non-minority students.

Therefore, the Subcommittee recommends that EPA consider eliminating both GRO Fellowship programs, while at the same time improving its marketing of the STAR Fellowship Program to minority serving institutions to encourage applications for graduate support from underrepresented groups. (Minority-serving institutions include Historically Black Colleges and Universities, Hispanic-serving institutions, and tribal colleges and universities.) Successful applicants for GRO Graduate fellowships clearly would be competitive applicants for the STAR fellowships, based on their similar applicant success rates and the quality of the research done by fellows in the two programs, and this would help EPA encourage members of minority groups to pursue graduate study and careers in the environmental sciences. Acknowledging the constraints of the current budget climate, **the Subcommittee also recommends that EPA seek to provide greater resources for the STAR Fellowship Program, both to address the increased number of applications that this change would produce, and to fund a greater percentage of those applications rated excellent.**

To provide sufficient resources to make a real impact on capacity building for undergraduate education, the Subcommittee recommends that EPA consider devoting the combined resources from both GRO Fellowship programs to fund competitively selected regional consortia, which would be designed to focus on environmental science opportunities for undergraduates. These consortia could combine undergraduate academic institutions, minority serving institutions (if allowed), and EPA laboratories. The consortia would be responsible for selecting the undergraduate students who would be given financial support, both during the academic year and for summer internships, which would provide real research experience. That hands-on research experience would greatly enhance the likelihood that the undergraduates would be accepted for graduate school in environmental science and engineering fields. The financial aspects of creating the consortia would involve finding partners from several different arenas; for example, the EPA money now used for GRO Fellowship programs and possibly some of the STAR Fellowship Program funds.

The Subcommittee recognizes the challenge of such a major restructuring of the Agency's fellowship programs, and therefore has made a number of recommendations to improve the effectiveness of the individual programs in the event that such a restructuring does not take place or takes a number of years to implement.

I.2.2 STAR Graduate Fellowship Program

The expense budget of $5,000 with each fellowship award is an important reason why some awardees accept STAR fellowships rather than competing fellowships with higher stipends. Awardees also cited it as an important factor enhancing their research and their ability to travel to meetings to present results. **Therefore, the Subcommittee recommends that EPA consider increasing this expense budget**.

I.2.3 GRO Graduate and Undergraduate Programs

As noted in Section I.2.1, the Subcommittee recommends that EPA consider a major restructuring of the GRO Fellowship programs. **If the GRO programs are maintained, however, the Subcommittee recommends that EPA review the impacts of its 2003**

determination that competition for program awards cannot legally be limited to minority serving institutions. The effect of this determination, and the redefinition of the program eligibility to include all institutions receiving less than $35 million in federal research and development funding annually, is to dilute the already limited program resources. Other federal agencies, such as the National Science Foundation (NSF) and the National Oceanic and Atmospheric Administration (NOAA), have programs serving minority institutions without such legal concerns being raised. If necessary, EPA should seek legislation to allow a similar focus.

I.2.4 Fellowship Recipient Selection Process

The Subcommittee finds that the selection process for all three programs is rigorous and appropriate. The evaluation and selection criteria that EPA actually uses, however, are not fully described in the announcements of funding opportunities. The announcements do not explain the review criteria used by the non-EPA peer reviewers, nor do they indicate that one of the final stages in the review of STAR fellowship applications is a review of relevancy to current EPA needs. **The Subcommittee recommends that EPA update its descriptions of the evaluation and selection criteria in the funding announcements to clearly describe the criteria employed in each step of the review process, to ensure transparency and fairness for all applicants.**

The Subcommittee also recommends that EPA broaden the categories used to sort applications to encompass emerging interdisciplinary fields of study, and consider making the categories used to sort the STAR Fellowship Program and the GRO Graduate Fellowship Program applications identical. Such consistency would allow for continuity and overlap of reviewers in the non-EPA expert panels, as well as a clearer comparison of the two programs.

I.2.5 Utility of Research Results to EPA and Others for Decision-Making

The Subcommittee was asked to evaluate whether the STAR Fellowship Program and the GRO Graduate Fellowship Program have produced basic and applied research usable by EPA and others for decision-making and/or policy development. The Subcommittee finds that existing data are not yet sufficient to answer this question. The general recommendations previously made about developing an overall information collection strategy provide some guidance about how EPA might acquire appropriate data. **Several additional specific recommendations are as follows:**

- **Review and compile the publication records of fellows. Although a comprehensive review may be a daunting task, such information should be readily available from resumes, which the Subcommittee recommends requiring fellows to periodically update annually for at least a 5-year period following the end of the fellowship. Other potential sources of this information include Thomson's ISI Web of Science, which provides citation records; Google Scholar, which provides some similar information without charge, and also links to citations in the "gray literature"; and EPA itself, through searching EPA reports for citations of fellows' work.**

- **Require that fellows provide links to their professional Web pages in the information that they submit to EPA. Such pages, particularly for those in academia, often provide a wealth of information on publications and other accomplishments of the pages' owners. EPA could add links to these home pages on an Agency Web site.**

I.2.6 Practices, Resources, and Effectiveness of Outreach for Assuring Diversity

In general, the Subcommittee commends EPA for its responsiveness and creativity in developing innovative solutions to meet the challenges resulting from the change in emphasis from the original Minority Academic Institution (MAI) to the current GRO Fellowship programs. That awareness of these programs is widespread is evidenced by the wide array of institutions where awardees study. It may be possible to develop several more specific metrics to measure the effectiveness of outreach efforts in assuring diversity as EPA continues its efforts to more effectively track fellows and compile data on their career paths. **The Subcommittee recommends that EPA consider the following as potential metrics as data become available:**

- **The number of minority students who obtain advanced degrees in environmental disciplines.**

- **The distribution or dispersion of students across eligible institutions, i.e., the concentration of fellowship recipients among colleges and universities.**

- **The number of awards to students pursuing Master's degrees relative to the number of awards to students pursuing doctoral degrees.**

I.2.7 Resources, Information Management, and Communications

Both financial and human resources seem sufficient for the STAR Fellowship Program as currently configured. **The Subcommittee notes, however, that inflation will over time erode the value of the fellowships and therefore recommends that EPA consider seeking additional funding within the next few years to maintain the value of the individual fellowships without resorting to funding fewer fellows.** As described in Section I.2.1, the Subcommittee concludes that funding for the GRO Fellowship programs is insufficient to achieve their purposes, and recommends that EPA consider a major restructuring of those programs.

Section I.2.1 summarizes the Subcommittee's recommendations regarding development of an information collection strategy to address concerns about information management.

EPA uses a variety of means to communicate information about the programs and to reach current and former recipients of fellowships. The substantial number of applications received relative to the number that can be funded would indicate that potential applicants to the STAR Fellowship Program and the GRO Graduate Fellowship Program are for the most part being effectively reached. There are, however, relatively few applicants to the GRO Undergraduate

Program. Communication with Congress and the press about the fellowship programs has historically been minimal. **To strengthen communication efforts, the Subcommittee recommends that EPA:**

- ✧ **Develop a user-friendly Web site for fellows and a listserv that will encourage easy communication among them and between EPA and each fellow. In addition, the upgraded database will allow fellows and alumni to track each other; to reach colleagues who can collaborate with them on projects, grants, and speaking opportunities; and to link with EPA after their fellowship is completed.**

- ✧ **Add a mentoring component to the program, so that there is a specific individual within EPA who would serve as a resource for the fellow. The mentor could complement the function of the student's academic advisor by, for example, helping the fellow find opportunities that expand his or her graduate school experiences and serving as a professional resource regarding career opportunities in federal agencies. The Subcommittee recommends that NCER solicit mentor volunteers from throughout EPA, matching professional staff with the fellows' fields of investigation. This strategy would bring increased visibility to the STAR and GRO Fellowship programs within the Agency.**

- ✧ **Market the STAR Fellowship Program strategically to minority communities and institutions of higher education. If EPA acts on the Subcommittee's recommendation to eliminate the GRO Graduate Fellowship Program, it will be even more vital to increase the marketing of the STAR Fellowship Program to insure diverse representation in that program. There remains a lack of data verifying that the STAR Fellowship Program has successfully reached underrepresented minority populations.**

- ✧ **Enhance efforts to increase the number of applicants to the GRO Undergraduate Fellowship Program. If the current program is replaced by the consortium approach recommended by the Subcommittee, expanded outreach would be a key function of the consortia.**

- ✧ **Work more effectively to communicate awards, results, and successes to a variety of audiences, including Congress and sponsoring institutions.**

- ✧ **Continue the biennial conference of awardees to recognize and celebrate the outstanding recipients of fellowships and provide networking opportunities for fellows.**

II. INTRODUCTION AND OVERALL FINDINGS AND RECOMMENDATIONS

II.1 Goals, Charge, and Structure of the Review

The Office of Research and Development (ORD) of the U.S. Environmental Protection Agency (EPA) is committed to independent expert review of its environmental research programs for objective evaluation of research at the program level; to establish "best practices" in federal research program design, management, and evaluation; and to assist the Agency in preparing performance and accountability reports to Congress under the Government Performance and Results Act of 1993. At ORD's request, the Board of Scientific Counselors (BOSC) Executive Committee has assisted with a series of these reviews.

As noted in Chapter I, EPA funds three academic fellowship programs to help maintain the expertise of its own research programs and that of other entities with responsibility for environmental protection: (1) the Science To Achieve Results (STAR) Graduate Fellowship Program; (2) the Greater Research Opportunities (GRO) Fellowships for Graduate Environmental Study Program; and (3) the GRO Undergraduate Fellowships for Environmental Study Program. The intended outcome of the STAR Graduate Fellowships Program is to encourage promising students to obtain advanced degrees and pursue careers in an environmental field. The GRO Fellowship programs are intended to strengthen the graduate and undergraduate environmental research capacities of institutions of higher education that receive limited funding to build such capacity, especially institutions with substantial minority enrollment. All three programs are administered by EPA's National Center for Environmental Research (NCER). Applications are reviewed by NCER with the assistance of volunteers from throughout EPA and by peer reviewers recruited from outside the Agency.

In June 2005, the BOSC Executive Committee agreed to review these programs, with the overall objectives to: (1) determine if these stated program outcomes are being obtained, and (2) provide direction and recommendations for future program operations, policies, and enhancements. This review was carried out by a Subcommittee of the BOSC composed of members with expertise in natural, physical, ecological, and health sciences in undergraduate and graduate education programs; economics; education at minority serving institutions; administration of federal and nonfederal fellowship programs; and administration of nonprofit environmental organization programs.

The review was conducted from January through May 2006. The Subcommittee members met three times via conference call for orientation to the Federal Advisory Committee Act (FACA) requirements, to discuss the review procedures, and to receive overview presentations on the fellowship programs by EPA. A face-to-face meeting was conducted at the Doubletree Hotel in Washington, DC, March 2-3, 2006. The meeting featured presentations by program leaders and

fellowship recipients as well as Subcommittee working sessions. Subsequent to the Washington meeting, a conference call was held on April 3, 2006, to review and complete the draft report.

The charge to the Subcommittee consisted of three questions about the outcomes of the three respective programs and four general questions that applied to all three programs, concerning the fellowship recipient process and decision criteria; the utility of the research funded to EPA and others for decision-making and policy; practices, resources, and effectiveness of outreach; and resources, information management, and communication processes and procedures. The complete charge is provided in Appendix A. The seven questions were as follows:

Charge Question 1: The stated purpose of the STAR Graduate Fellowship Program is to encourage promising students to obtain advanced degrees and pursue careers in an environmental field, a benefit to both the public and private sectors. Has the STAR Graduate Fellowship Program produced the desired outcome? Please make recommendations for enhancing the potential for future positive outcomes.

Charge Question 2: The GRO Graduate Fellowship Program, like its predecessor, the MAI Graduate Fellowship Program, is intended to strengthen the graduate environmental research capacity of institutions of higher education that receive limited funding to build such capacity, especially institutions with substantial minority enrollment. Has the GRO Graduate Fellowship Program fulfilled its purpose? Are there barriers or obstacles that prevent EPA from fully reaching this goal? Please make recommendations for enhancing the potential for future positive outcomes.

Charge Question 3: The GRO Undergraduate Fellowship Program, like its predecessor the MAI Undergraduate Fellowship Program, is intended to strengthen the undergraduate environmental research capacity of institutions of higher education that receive limited funding to build such capacity, especially those with substantial minority enrollment. By providing quality environmental education support for undergraduate students, it was hoped that recipients would pursue careers in environmentally related fields beyond the baccalaureate level. Has the GRO Undergraduate Fellowship Program fulfilled its purpose? Are there barriers or obstacles that prevent EPA from fully reaching its goal? Please make recommendations for enhancing the potential for future positive outcomes.

Charge Question 4: Please review the fellowship recipient selection process and current decision criteria. Do they assure selection of high-quality fellowship recipients performing scientific research in areas that best support the Agency's mission? Please make recommendations for improvements.

Charge Question 5: Part of ORD's mission is to perform research and development to identify, understand, and solve current and future environmental problems. As such, an inherent outcome of the STAR Fellowship Program and the GRO Graduate Fellowship Program is to produce basic and applied research results usable by EPA and others for decision-making and/or policy development. Has this outcome been obtained? How can the programs be enhanced to produce results relevant to environmental protection?

Charge Question 6: Since the inception of the fellowship programs, assuring diversity among fellowship recipients has been a goal of NCER. Please comment on the practices, resources, and effectiveness of NCER's outreach efforts and make recommendations for enhancing the potential for positive outcomes in the future.

Charge Question 7: Please review the fellowship programs' resources, information management, and communication processes and procedures. Are there any recommendations for program improvements or sustainability?

The Subcommittee organized the review around the three fellowship programs, with this chapter presenting an introduction, background, and general findings and recommendations that encompass all three programs. Chapters III and IV present additional information about the STAR and GRO Fellowship Programs, respectively, as well as findings and recommendations specific to the respective programs.

II.2 Program Background

The STAR Program was initiated in 1995 when Congress instructed EPA to set aside 10 percent of the annual research and development budget, approximately $100 million, for the STAR competitive grants program, and in turn to devote 10 percent of those resources, about $10 million per year, to the fellowship program. Through the STAR Fellowship Program, students throughout the country compete for up to 3 years of support for Master's and doctoral studies in a diversity of fields in the environmental sciences. The program draws approximately 1,600 applications annually. Typically, about 200 are rated excellent, and EPA is able to fund about 100 new fellows each year. Since the inception of the program, approximately 1,125 STAR fellowships have been awarded. Funding for the STAR Fellowship Program was eliminated in the Fiscal Year (FY) 2002 budget, but was restored in 2003 to the original level of about $10 million and has since been stable.

The GRO Graduate and Undergraduate Fellowship Programs are the current versions of ORD's limited competition fellowship programs. The first limited competition fellowships, previously known as the Culturally Diverse Academic Fellowships (CD), and starting in 2000, as the Minority Academic Institution (MAI) fellowships, date back to 1981. The programs were established in response to Executive Order 12320, commonly referred to as the White House Initiative on Historically Black Colleges and Universities (HBCUs). Other White House initiatives regarding minority institutions followed, and the eligibility for fellowships was expanded to include them as well.

In the fall of 2003, upon the advice of EPA's Office of General Counsel (OGC), the eligibility requirements of the limited competition programs were broadened, and the name was changed from MAI to GRO. Previously, MAI program applicants were required to attend an HBCU or other minority serving institution (e.g., Hispanic or tribal), but according to the OGC, the Agency did not have sufficient statutory authority to limit the fellowships competition to these institutions. As a result of the policy changes, the GRO applicant pool was broadened to include any eligible student attending an accredited college or university in the United States that

received less than $50 million in federal research and development money (reduced to $35 million in the 2006 solicitation). Until the 2003 policy change, the focus was on building capacity at HBCUs, Hispanic Serving Institutions, Tribal Colleges and Alaskan Native Serving Institutions, and Native Hawaiian Serving Institutions. From 1997 to 2005, 116 undergraduate fellowships were awarded, and 122 graduate fellowships were awarded from 1999 to 2005. Currently, the GRO Graduate Fellowship Program funds about 15 fellowships per year with an annual budget of $1.5 million, and the GRO Undergraduate Fellowship Program funds 15 fellowships per year with a budget of $650,000. As with the STAR fellowship recipients, GRO fellows are selected to receive the awards only after their proposals have undergone a rigorous merit review by experts outside of EPA.

II.3 General Findings

This section describes the Subcommittee's findings in several areas that cut across all three fellowship programs: achievement of intended program purposes, the fellowship recipient selection process, the utility of the research funded to EPA and others for decision-making and policy, and information management. Section II.4 presents the recommendations that follow from these findings. Chapters III and IV present additional findings and recommendations specific to the STAR and GRO Fellowship Programs, respectively.

II.3.1 Achievement of Intended Program Purposes

For purposes of this review, their different stated purposes are key distinctions between the STAR and GRO programs. The STAR Fellowship Program focuses on encouraging individual students to obtain advanced degrees in the environmental field, while the GRO Fellowship Programs are intended to build capacity for environmental research at schools and universities receiving limited federal funds, based on the premise that this outcome will be achieved by funding individual fellows. As noted previously, the STAR and GRO Fellowship Programs also have substantially different funding levels. Both of these features directly affected the Subcommittee's conclusions about the programs' respective effectiveness in achieving their goals and recommendations about the programs' futures.

The Subcommittee finds that, with a caveat noted in Section II.3.3 about data availability, the STAR Fellowship Program appears to be meeting its purposes of encouraging promising students to obtain advanced degrees and pursue careers in an environmental field. The Subcommittee finds that the resources allocated to the GRO Fellowship Programs, which are widely spread across institutions, are insufficient for the purpose of capacity building, and recommends that EPA consider a major restructuring of these programs (see Section II.4). Fifteen fellowships annually in each of the two GRO programs, awarded to students at institutions from across the country, are simply not enough to have a significant impact on research capacity at specific institutions. Further, there is limited competition for the awards in the undergraduate program (a success rate of approximately 33%, compared to 6-7% for the graduate program, similar to that of STAR), and EPA's redefinition of the programs away from explicitly targeting underrepresented groups to schools receiving limited federal funds has meant that a substantial number of fellowships are awarded to non-minority students.

II.3.2 Fellowship Recipient Selection Process and Decision Criteria

The Subcommittee finds that the selection processes for the STAR and GRO Fellowship Programs are rigorous and appropriate. Applications are subjected to peer review by multiple reviewers, and the quality of research subsequently done by successful applicants is high. The evaluation and selection criteria that EPA actually uses, however, are not fully described in the announcements of funding opportunities. For example, the funding opportunity announcement for the Fall 2005 STAR Graduate Fellowship Program describes the criteria and evaluation and selection process as follows:

> *Criteria*: Students at each educational level will be evaluated on his or her potential for success in a graduate study program based on the information provided in the pre-application as described above under "Content and Format for Pre-Applications." The reviewers will consider academic records, recommendations, and career goals and objectives. Reviewers are asked to assign a summary score of excellent, very good, good, fair, or poor for each pre-application. This review is designed to evaluate each proposal according to its scientific merit.
>
> *Evaluation and Selection Process*: Non-EPA experts from the appropriate field of study will review the pre-applications and letters of recommendation. Reviewers are recruited based on specialty fields represented by the pre-applications. Pre-applications that receive scores of excellent from the peer reviewers are subjected to further review within the EPA. Finalists will be selected for award of a fellowship based on the availability of funds, evaluations of reviewers, and program goals, such as distribution of awards across disciplines, institutions, and geography; degree level being sought; and other possible indicators of program balance. The NCER Director makes final funding decisions.

The language in the solicitations for the solicitations of the GRO Graduate and Undergraduate Fellowship Programs is similar. The solicitations do not clearly describe the review criteria used by the non-EPA peer reviewers, nor do they describe how the further review within EPA is conducted, for example, panel composition, criteria and methods for evaluating applications, and methods for ranking applications. Therefore, the Subcommittee finds that the selection processes and decision criteria, while rigorous and appropriate, are not fully transparent to applicants.

The relevancy review for the STAR Fellowship Program further raises a concern about potential conflict of interest, with the possibility of individuals scoring applications in their discipline higher than in other disciplines. EPA addresses this potential conflict of interest by requiring those giving a relevancy score of poor (on a proposal previously ranked excellent by the non-EPA experts panel) to justify the rating.

Subcommittee members also expressed some concern about the value of including Master's students in the competitions for the STAR and GRO Graduate Fellowship awards, although no consensus was reached on specific recommendations. Most current Master's degrees in environmental fields now are professional degrees rather than research degrees. This makes most applications from Master's degree students inappropriate, and there are no provisions for EPA

recovering funding granted and spent if a student chooses to follow a professional option, rather than a research degree. There does not seem to be a shortage of trained students with Master's level qualifications, so it is hard to make an argument from a workforce perspective for funding professional Master's degrees. Master's students also may be at a disadvantage in terms of experience and the scope of their proposals because they are at an earlier stage in their careers, yet they compete directly with Ph.D. students for support. Although peer review panelists are instructed to use different criteria to evaluate the two, the Subcommittee questioned how well this would work in practice.

The Subcommittee suggests revisiting the discipline categories used to sort applications. For example, a *watershed concept* best integrates aquatic and terrestrial systems, *landscape ecology* perhaps best integrates urban and regional planning, and *restoration ecology* needs to command increased support in the discipline of environmental engineering if we are to achieve environmental sustainability. In other words, additional emphasis and awards will be necessary in the future as we move from disciplinary to transdisciplinary and integrative science (Barrett and Odum, 2000; Barrett, 2001). Another observation made by the Subcommittee is that the categories used to sort the applications by discipline are not the same for the STAR Fellowship Program and the GRO Graduate Fellowship Program. Given that STAR and GRO fellows are working in the same range of disciplines, the Subcommittee finds that this difference is neither useful nor appropriate.

II.3.3 Utility of Research to EPA and Others for Decision-Making and Policy

Charge Question 5 applies to the STAR Fellowship Program and the GRO Graduate Fellowship Program, but not to the GRO Undergraduate Fellowship Program. Measuring performance of these programs is difficult. The programs have multiple objectives, which sometimes involve tradeoffs, and EPA is encouraging students to undertake research at the frontiers of current knowledge. In this sense, a program may be valuable even if only a small fraction of the fellows succeed, as long as those successes are significant.

The Subcommittee's conclusions about program outcomes in this report are based on extensive but primarily anecdotal data. Therefore, the Subcommittee finds that existing data are not yet sufficient to answer this question, but offers some guidance for how EPA might approach the issue. Additional discussion of this topic is provided in Chapters III and IV.

At the simplest level, success is defined by (1) whether the graduate fellows completed their advanced degree and (2) whether they are working in an environmental area. If these two initial criteria are not met, it is likely that the program is not achieving its intended outcome. Fortunately, these are the easiest data to gather, particularly if steps are taken to ensure that the data are supplied at the time the grant is closed out, as discussed in Section II.4.4. Cases where either or both of these criteria fail should be examined to see if there are lessons that can be learned that would help avoid these mistakes in the future, with the caveat that they may be impossible to avoid entirely.

The next set of criteria involves the graduate fellows' work history. Here NCER could develop a set of coding categories for the type of jobs held, to be included in the database. One of the

Agency's obvious objectives is to help supply well-trained scientists for its own staff. Because EPA also works with other federal, state, and local agencies and those agencies can have considerable responsibility for environmental issues, the Agency also has an interest in graduate fellows taking jobs in those agencies.

Another criterion that is important because it helps to train future generations of scientists is the placement of graduate fellows in jobs such as assistant professorships at major research institutions. Graduate fellows also may find positions at teaching institutions where they can help train a workforce at the Bachelor's degree level.

Another way to judge the success of a graduate fellow is by his or her publication record in the major peer-reviewed literature. This could most easily be obtained from a current copy of the graduate fellow's resume. The standard measure of the impact of scholarly work is its citations by other scholars. This information also can be obtained from Thomson's ISI Web of Science. There are two things worth noting here. First, this information is fairly time intensive to collect, particularly if the graduate fellow has a common name. Second, while citation counts are a good measure of influence within a discipline, it is difficult to compare citation counts across fields because of the differences in publication and citation practices.

An alternative to the Web of Science is Google Scholar. Google Scholar includes a wider range of scholarly literature than the Web of Science, and in particular, it includes a large number of government reports. One potential measure of the influence of a graduate fellow's research on EPA's work is its citation in the Agency's reports. These can be found by searching the Agency's internet domain epa.gov. Such a search could help provide initial information for doing a more detailed analysis of the role a particular scholar's work has had on the Agency's mission.

A scientist may at various points in their career receive awards or honors that help to point out the significance of the contributions they have made. Again, a copy of the graduate fellow's current resume is the best place to obtain this information. Increasingly, these are made available and updated online. A link to the graduate fellow's homepage should be added to the Agency's Webpage listing each fellow.

Finally, because an expressed purpose of the GRO fellowship programs has been to increase the diversity of the workforce in environmental sciences, it is important to gather demographic data on the fellows to compare them to the current population of environmental scientists as one way to judge the program's success.

In conclusion, the Subcommittee finds that the process of evaluating the usefulness of research usable for decision-making and/or policy development is complex, and EPA lacks tools to systematically measure this outcome over time.

II.3.4 Information Management

Information management has been the source of concern and criticism in previous program evaluations. For example, in 2003, the EPA Office of the Inspector General (OIG) was harshly critical of the lack of performance metrics to determine the results and achievements of the

STAR fellows and to evaluate demographic information on applicants and recipients of the fellowships (EPA, 2003).

The STAR Fellowship Program is widely viewed as successful (e.g., NRC, 2003), attracting high performers who are moving into environmental science careers. To measure this, however, NCER too often has relied on informal reporting from former fellows, tracking a single-year sample of program alumni, and reviewing the strong publication records of several current and former fellows. Because this anecdotal information indicates that the program is vital and appears to meet established goals, it is important to quantify such information and to develop mechanisms to disseminate it widely.

In the Subcommittee's discussions with NCER staff—during the face-to-face meeting held March 2-3, 2006, in Washington, DC—it was clear that efforts have been made to remedy the information management problems by establishing the Fellowship Information Inventory (FII). It is a concern of the Subcommittee, however, that this information inventory remains insufficient. There continues to be an urgent need to improve data collection and then make the data accessible, so individuals inside and outside of EPA will have the necessary information available to measure the effectiveness of the fellowship programs, to track professional accomplishments of program alumni, and to augment current and future minority participation in the STAR Fellowship Program. The FII has inherent problems that suggest that it may be wise to abandon it and to start over. The problems stem from the fact that: (1) it was adapted from a database that was not designed specifically for tacking the careers of fellows; (2) it is difficult to navigate; (3) it relies on fellow input, which is inconsistent; and (4) not all data fields are meaningful for all users, but there appears to be no mechanism to block irrelevant fields for a specific subset of users. Also, it should be adapted to broaden the categories of study, including new integrative fields of research. After approximately 1 year of effort, the inventory still is not a useful tool to track the current status of individual fellows or to measure program outcomes and successes.

Information management issues for the GRO Fellowship Programs are identical to those of the STAR Fellowship Program. Only recently have outcome assessments been required for the GRO programs. The Subcommittee finds that not having sufficient data to measure outcomes is a serious flaw and limits EPA's ability to judge whether the programs have been successful.

Fellows have been poor providers of the information needed to make the inventory successful. NCER staff has encouraged participation, but the results are disproportionate. Also, NCER has tried through available paper files to back-fill the inventory, but there is a paucity of consistent available data to make the database workable. A database designed for tracking fellowship outcomes and a determined effort to follow-up with fellows for information made by NCER staff, would produce excellent data for measuring the success of the STAR and GRO Fellowship Programs. Data collected should provide information in the following areas tracked over a 5-year period from the conclusion of the fellowship: completion of the graduate degree, current employment in an environmental or ecological field of study, work history (especially important to know if they worked for EPA or other federal agencies in an environmental area), publications record, prestigious fellowships or awards received, direct use of results by the EPA, and demographic information.

II.4 General Recommendations

This section describes the Subcommittee's recommendations corresponding to the findings in Section II.3. Chapters III and IV present additional recommendations specific to the STAR and GRO Fellowship Programs, respectively.

II.4.1 Recommendations Related to Achievement of Intended Program Purposes

As stated previously, the Subcommittee concludes that the resources allocated to the GRO Graduate and Undergraduate Fellowship Programs are insufficient for the purpose of capacity building. Therefore, the Subcommittee recommends that EPA consider eliminating both programs, while at the same time improving its marketing of the STAR Fellowship Program to minority serving institutions to encourage applications for graduate support from underrepresented groups. The GRO Graduate Fellowship Program would be folded into the STAR Fellowship Program, because the basic criteria for both programs are the same. This also would help EPA address the original MAI program goals of stimulating members of minority groups to pursue graduate study and careers in the environmental sciences. Acknowledging the constraints of the current budget climate, the Subcommittee also recommends that EPA seek to provide greater resources for the STAR Fellowship Program, both to address the increased number of applications that this change would produce, and to fund a greater percentage of those applications currently rated excellent.

The Subcommittee believes that a more effective way to support the students targeted by the GRO Undergraduate Fellowship Program would be to fund several regional consortia, which would be designed to focus on environmental science opportunities for undergraduates. These consortia could combine undergraduate academic institutions, minority serving institutions if allowed, and EPA laboratories. The consortia would be responsible for selecting the undergraduate students who would be given financial support, both during the academic year and for summer internships, which would provide real research experience. That hands-on research experience would greatly enhance the likelihood that the undergraduates would be accepted for graduate school in environmental science and engineering fields. Resources available to fellows should include mentoring assignments so the undergraduates would have a specific point of contact to answer questions and provide opportunities and guidance.

The financial aspects of creating the consortia would involve finding partners from several different arenas; for example the EPA funding now used for the GRO fellowship programs and possibly some of the STAR Fellowship Program funds could be applied to the consortia. Other federal agencies (e.g., National Oceanic and Atmospheric Administration [NOAA], National Science Foundation [NSF], and the Department of Defense) have similar programs that may be used as models or partners. This cohort and institution approach may provide better continuity between the undergraduate and graduate program goals, and provide impacts beyond the specific funding provided. There also may be both programmatic and infrastructure advantages of requiring the consortia to include appropriate EPA and other agency laboratories or offices, as well as universities receiving STAR fellowship awards. As funding for such consortia tends to be

of longer duration than individual fellowships (e.g., 5 years), this also could reduce the administrative support required to issue and process annual solicitations.

The Subcommittee recognizes the challenge of such a major restructuring of the fellowship programs; therefore, Chapters III and IV provide a number of recommendations to improve the effectiveness of the current fellowship programs in the event that such a restructuring is not implemented or takes years to implement.

II.4.2 Recommendations Related to Fellowship Recipient Selection Process and Decision Criteria

To assure transparency and fairness, the fellowship funding opportunity announcements should be updated to clearly describe the criteria and evaluation and selection process used by EPA; for example, the relevancy review used in the STAR Fellowship Program.

EPA should broaden the categories used to sort applications to encompass emerging interdisciplinary fields of study, and should consider making the categories used to sort the STAR Fellowship Program and the GRO Graduate Fellowship Program applications identical. Such consistency would allow for continuity and overlap of reviewers in the non-EPA expert panels, as well as a clearer comparison of the two programs.

II.4.3 Recommendations Related to Utility of Research to EPA and Others for Decision-Making and Policy

As stated in Section II.3.3, the Subcommittee finds EPA lacks tools to systematically measure this outcome over time, and suggests that that Agency explore a number of such tools to gather the data needed. Additional related recommendations follow in the next section.

II.4.4 Recommendations Related to Information Management

To remedy long-term deficiencies in collection of data about program outcomes, and to provide proper access to needed information, the Subcommittee recommends that EPA undertake the following actions:

- ✧ Draft an overall information collection strategy, which includes design of an appropriate database that contains data from all three fellowship programs. Using a professional survey specialist to create the database would eliminate the likelihood of poor design.

- ✧ The use of telephone follow-up with each fellow by NCER staff is recommended as a low-technology, personalized method of securing needed information.

- ✧ In connection with collecting information for the FII, require institutions with fellowship recipients to provide the initial data on the careers, contributions, awards, and papers published by the institutions' graduates supported under EPA's fellowship programs.

- ✧ Require fellows to submit an up-to-date resume annually for at least 5 years from the conclusion of the fellowship.

- ✧ Determine whether fellows have completed their degrees and whether they currently are employed in an environmental field of study.

- ✧ Require that fellows provide links to their professional Web sites in the information that they submit to EPA. Such sites, particularly for those in academia, often provide a wealth of information on publications and other accomplishments of the sites' owners. EPA could add links to these homepages on an Agency Web site.

II.4.5 Recommendations Related to Communication Processes and Procedures

To strengthen communication efforts in all three fellowship programs, the Subcommittee recommends that EPA take the following steps:

- ✧ Develop a user-friendly Web site for fellows and a listserv that will encourage easy communication among them, and between the EPA and each fellow. In addition, the upgraded database (see Section II.4.4) will allow current and former fellows to track each other; reach colleagues who can collaborate with them on projects, grants, and speaking opportunities; and continue to link fellows with the EPA after their fellowships are completed.

- ✧ STAR and GRO fellows should be invited and encouraged to conduct their research at EPA laboratories and other national laboratories, which conduct important research in environmental science and are home to some of the nation's premier scientists. If this opportunity is made available, the Subcommittee recommends that fellows be provided with mentors both at the federal laboratory and at their home institution. The mentor could complement the function of the student's academic advisor by, for example, helping the fellow find opportunities that expand his or her graduate school experiences, and serving as a professional resource regarding career opportunities in federal agencies.

- ✧ NCER should solicit mentor volunteers from throughout EPA for each fellow selected, matching professional staff with the fellows' fields of investigation. This strategy would bring increased visibility to the STAR and GRO Fellowship Programs within the Agency. Interactions with EPA mentors also would enhance the students' productivity, enrich their academic experience, and help ensure that their training stays on schedule. If the graduate student is working at a national laboratory or center of excellence, brief monthly progress reports should be provided to the sponsoring institution and/or mentor, as well as the coordinator.

- ✧ Work more effectively to communicate awards, results, and successes to a variety of audiences, including Congress and sponsoring institutions.

- ✧ Continue the biennial conference of fellowship awardees to recognize and celebrate the outstanding recipients of fellowships and provide networking opportunities for fellows.

III. STAR GRADUATE FELLOWSHIP PROGRAM

Approximately 100 new STAR fellowship awards are made each year in 18 broad categories. Over 10 years, STAR fellows have been supported at 163 colleges and universities. These awards are made to students at the very best research and academic universities in the nation, ranging from California to the Midwest to the north- and southeastern United States. Approximately 90 percent of the STAR fellowships are awarded to doctoral students, with 10 percent awarded to students at the Master's level.

III.1 Achievement of Intended Program Purposes

Overall, the Subcommittee finds that the fellows funded by the STAR Fellowship Program have made excellent contributions in environmental science and a number of them have continued to contribute, occupying positions in academia, consulting, and within EPA. Although other federal agencies fund a number of fellowship programs, none are dedicated exclusively to the environmental sciences. The STAR Fellowship Program, therefore, is clearly of value to EPA and the nation in helping to educate the next generation of environmental scientists. A 2003 review by the National Research Council confirmed the importance of the STAR Fellowship Program, noting that the program "ensures a continuing supply of graduate students in environmental science and engineering who provide a strong foundation for the nation's environmental research and management efforts" and recommended that the program continue to be funded (NRC, 2003).

III.2 Practices, Resources, and Effectiveness of Outreach

Charge Question 6 is focused on the practices, resources, and effectiveness of outreach for assuring diversity and, therefore, is arguably more central to the GRO Fellowship Programs than the STAR Fellowship Program. The large number of applications relative to available fellowships suggests that the STAR Fellowship Program is well known to the community at large, although data are lacking concerning the representation of minority groups among the applicants. It is recommended in Chapter II, however, that the GRO programs be eliminated. If this recommendation is implemented, it would create a concomitant imperative to increase efforts to market the STAR Fellowship Program to minority communities and institutions of higher education, as discussed under Communication Processes and Procedures in Section III.3.2.

III.3 Resources and Communication Processes and Procedures

This section presents the Subcommittee's findings specific to the STAR Fellowship Program in the areas of resources and communication processes and procedures. Findings on information management for all three programs are presented in Section II.3.4.

III.3.1 Resources

In 1995, when the STAR Program was established, Congress directed ORD to use 10 percent of the overall STAR research grants program budget to fund fellowships for graduate students working in fields of environmental science and engineering that supported the goals of EPA. That allocation has provided excellent support for the fellowship program, but unfortunately, also establishes a limit that makes expansion of the program difficult to achieve. The STAR Fellowship Program currently draws 1,600 applications annually, which are winnowed through peer review. In most years, approximately 200 applications are rated excellent, but due to financial resources, NCER is limited to funding 100 new STAR graduate fellowships annually (i.e., approximately 50% of those applications rated excellent). Thus, there are an additional 100 excellent contributions in environmental science and engineering that could be funded each year. These represent missed opportunities during a time when problems of increasing temporal and spatial scale in environmental concerns require interdisciplinary training to meet the EPA research mission and decision-making challenges. Expansion may not be viable at the present given the tight fiscal constraints of the federal budget. If financial resources become more accessible in the future, however, funding additional STAR fellowships would be worthy of consideration by NCER.

Each STAR fellow receives a total of $37,000 a year for up to 3 years, which includes up to $12,000 for tuition and fees, $20,000 for a stipend, and $5,000 for expenses such as publications, travel, equipment, and database analysis. The Subcommittee finds that this funding level is sufficient to support quality research, especially when cost sharing is available to the recipient through his or her graduate committee that reviews and refines each investigation. The expense budget of $5,000 with each award is an important reason why some awardees accept STAR fellowships rather than competing fellowships with higher stipends. Awardees also cited it as an important factor enhancing their research and their ability to travel to meetings to present results.

In the area of human resources, NCER has allocated 11 full-time equivalents (FTEs) for the management of the STAR, GRO, and other fellowship programs. The STAR Fellowship Program receives the lion's share of this effort because of its size. This does not represent 11 wholly dedicated staff members: three individuals work solely on the fellowships, and the other 8 FTEs are comprised of the efforts of many individuals in NCER and other parts of the Agency (such as the Grants Administration Division and the Financial Management Division) who have partial responsibility for the fellowship programs. The project officers and other experienced professionals assigned to oversee the STAR Fellowship Program are valuable assets. It might be more cost effective if more than three FTEs focus solely on the STAR Fellowship Program. In general, both financial and human resources seem sufficient for the STAR Fellowship Program as it currently is configured.

III.3.2 Communication Processes and Procedures

NCER uses a variety of communication processes and procedures for specific target audiences. In reaching current and former STAR fellows, NCER staff uses both formal and informal methods of communication. Universities are reached through basic program announcements to encourage potential applicants. Unfortunately, communication with Congress and the press about the fellowship programs has been minimal.

NCER sends recipients of STAR fellowships a formal letter acknowledging their selection and provides them with a document that outlines the details of the contract. Awardees are contacted officially about the biennial fellows' conference, and introduced to the Web site and the FII. Informally, there are e-mails and telephone calls between project officers and fellows, and there is time spent face-to-face with each other at the biennial conferences. Overall, the Subcommittee finds that the communication processes and procedures with STAR fellows are sound.

Program solicitation and advertising through universities is minimal because there is no shortage of STAR applications. Because applications continue on a sharp upward trajectory, while the number of fellowships awarded annually is static at about 100, this is a task to which little effort has been directed.

Disseminating information to Congress, other federal agencies, and media outlets has been historically a passive effort. An attempt has been made in recent years to take advantage of these opportunities. Letters have been sent to members of Congress who have STAR fellowship recipients living in their districts to announce awards, and there has been some limited effort to reach the hometown press of the fellows to announce the selections.

III.4 Recommendations for the STAR Graduate Fellowship Program

The general recommendations presented in Section II.4 apply to the STAR Fellowship Program and are not repeated here. This section summarizes additional recommendations based on the Subcommittee's findings in Sections III.1, III.2, and III.3.

III.4.1 Recommendations Related to Resources

Given the erosion of the dollar value due to inflation, the Subcommittee recommends that EPA seek additional funding for the fellowships (STAR and others), increasing the current total of roughly $10 million within the next few years to maintain program quality and quantity. If affordable, the Subcommittee recommends increasing the $5,000 expense allotment to broaden each fellow's opportunities.

III.4.2 Recommendations Related to Communication Processes and Procedures

To strengthen communication efforts, the Subcommittee recommends that EPA take the following steps:

- ✧ Market the STAR Fellowship Program strategically to minority communities and institutions of higher education. Elsewhere in this report, it is recommended that the GRO Graduate Fellowhips Program be abolished because individuals eligible for that program are fully eligible for the STAR Fellowship Program. With that change, it would be even more vital to increase STAR marketing to insure diverse representation in that program. There remains a lack of data verifying that the STAR Fellowship Program has successfully reached underrepresented minority populations.

- ✧ Continue the recent efforts to eliminate a passive posture of communication of results. Relevant congressional staff should be kept informed about the successes of the program. STAR fellows should be encouraged to speak twice a year during their fellowship years to high school or college audiences, encouraging students to pursue careers in fields of environmental science and engineering. Also, NCER staff could create a template presentation that current and former fellows could use at school or national meetings to promote the STAR Fellowship Program.

IV. GRO GRADUATE AND UNDERGRADUATE FELLOWSHIP PROGRAMS

The underlying authority for the GRO Graduate and Undergraduate programs is based on Executive Order 12320 issued by President Reagan in 1981. This order set in motion a government-wide effort to strengthen the nation's HBCUs. Initially, these efforts were guided by a Presidential Advisory Board on HBCUs to advise the President and the Secretary of Education on methods, programs, and strategies to strengthen these institutions. Ultimately, they were guided by a senior-level executive with oversight for implementation in each federal agency.

In 1991, EPA Administrator William K. Reilly established a task force and asked it to develop programs under which EPA could support the capacity of MAIs to conduct environmental research, graduate scientifically trained personnel, and provide public education and outreach. One recommendation of that task force was that EPA develop fellowship and scholarship programs for minorities. At that time, only a small graduate/undergraduate fellowship program for minority institutions was managed by ORD, and no undergraduate scholarship program existed.

In 1995, NCER was given responsibility for managing the CD Program, later renamed MAI, defined to include, in addition to the HBCUs, the Hispanic Association of Colleges and Universities (HACU) and institutions that were members of the American Indian Consortium for Higher Education. In 2003, EPA's Office of General Counsel advised that the competition could not be limited to minority academic institutions. In response to that determination, EPA broadened the eligibility requirements and changed the name of the program to GRO. The new requirements were written to include any eligible student attending an accredited college or university that received less than $50 million of federal research and development funding annually, a limit later reduced to $35 million. This change introduced one other effect, which was to broaden the applicant pool.

IV.1 Achievement of Intended Program Purposes

As the history of these programs makes clear, the original goals of the MAI and GRO programs were to increase the proportion of underrepresented minorities in the environmental field and to build capacity for environmental research at schools and universities that were less likely to receive federal funds, i.e., predominantly minority serving colleges and universities. The intended outcome of the GRO programs now is stated as institutional capacity building. To accomplish these various goals, EPA provided funding to individuals attending those schools, rather than to the schools themselves. The Subcommittee noted that the criteria for making awards have changed substantially in the last few years, but these changes have not enhanced achievement of the programs' larger goals.

Given EPA's focus on capacity building at the institutional level, the Subcommittee used as a working definition for capacity building increasing the ability of the institution to garner sufficient funds to support excellent environmental research and education. The Subcommittee does not believe this goal has been reached, and further, current program structures will not lead to this goal because the programs simply are not designed to do so. The current approach of providing support to individuals, spread among many institutions, does not enable cohorts and programs to build momentum and new capabilities at any particular institution. As such, the goal of building such capacity at universities with already limited funding and those with substantial minority enrollments will not benefit institutionally from the programs as currently structured.

With respect to the GRO Undergraduate Fellowship Program's goal of having participants pursue environmental careers beyond the baccalaureate level, the main performance indicators are whether the fellows finish their degrees and continue to work in an environmental area. A separate and easy to measure criterion is whether the fellows go on to obtain an advanced degree in an environmental area. This degree could be a Master's, a Ph.D., or a professional degree. With respect to whether a fellow is working in environmental science, categories that could be coded include EPA, other government agencies, academia, private sector, and nongovernmental organizations. These categories should match those of other fellowship programs. It should be kept in mind that it may be a considerable number of years before a GRO Undergraduate fellow settles down into permanent employment, particularly if they go on to get a Ph.D. and hold one or more postdoctoral appointments. Finally, because an expressed purpose of this program is to increase the diversity of the workforce in environmental sciences, it is important to gather demographic data on the GRO Undergraduate fellows to compare them to the current population of environmental scientists as one way to judge the program's success.

Based on the information provided to the Subcommittee, it is clear that for the students participating in the program, the criteria suggested above are being met. Between 1990 and 2001, 17 of 19 fellows (89%) responding to the survey met one or more of these criteria. Between 1997 and 2003, however, only 32 of 58 (55%) fellows responding did so. It is not clear if the decrease is significant. Although the program does appear to benefit those who participate, the Subcommittee finds that the overall impact of the GRO Undergraduate Fellowship Program is fairly low. Between 1997 and 2005, 116 undergraduate fellowships were awarded, resulting in roughly 15 fellows per year. Although the impacts on individuals are positive, providing support to such a small number of participants per year, spread among 23 institutions (2004 to 2005 data), is not a very significant contribution to the nation. The program is insufficiently funded and lacks the institutional capacity and the universities to have a major impact.

Overall, there is a fundamental disconnect between the methods (funding individuals) and the stated goals (building institutional research capacity) of the GRO programs: increasing the former does not necessarily lead to the latter. EPA appears to lack a substantive definition of "research capacity" or the tools to effectively measure research capacity. Based on these factors, the Subcommittee believes the GRO programs have not fulfilled their main purposes; the strategy of funding of individuals at schools that receive limited federal funding is not an effective means of increasing environmental research capacity or the diversity and representation of minorities in environmental fields. In response, the Subcommittee has recommended that EPA consider a major restructuring of these programs (see Chapter II). That recommendation is not

repeated here. Rather, acknowledging the challenge involved in such a restructuring, this chapter concludes with a series of recommendations that could improve program performance if such a restructuring were not implemented or if it takes years to implement it.

IV.2 Practices, Resources, and Effectiveness of Outreach

Outreach efforts for the MAI and GRO programs have centered on well-established, conventional techniques, such as sponsorship of exhibit booths at conferences, participation on panels and workshops, and attendance at career fairs at minority serving institutions. Future outreach efforts for the GRO programs will necessarily be different because of the shift in emphasis, but they are expected to follow the same protocol.

The critical question to address here is, "What metrics should be used in judging the effectiveness of outreach efforts?" For the MAI programs, one metric to use would have been the increase in the number of, or the rate of increase in the number of, minorities who obtained undergraduate or advanced degrees in environmentally centered disciplines. For the GRO programs, some of the same metrics could be used, though not restricted to minorities, because these programs are intended to:

- ✧ Encourage promising students from smaller institutions to obtain advanced degrees and pursue environmental careers.

- ✧ Build capacity for environmental research at schools and universities receiving limited federal research and development funds.

- ✧ In the case of the undergraduate program, encourage undergraduate students to go beyond the baccalaureate degree.

Another possible metric is the distribution, or dispersion, of students across eligible institutions, although the differing periods of time covered by available data demand some caution in interpretation. For example, available data covering the period from 1999 to 2003 for the MAI Graduate Fellowship Program show that:

- ✧ Seventy-eight (78) fellowships were awarded to students in 25 different institutions.

- ✧ Seventy-three percent (73%) of the fellowships were awarded to students who attended schools where three or more fellowships were awarded.

- ✧ Fifteen percent (15%) of the fellowships were awarded to students at schools where only one fellowship was awarded.

For the GRO Graduate Fellowship Program from 2004 to 2005:

- ✧ Forty-three (43) fellowships were awarded to students in 30 different institutions.
- ✧ Thirty-three percent (33%) of the fellowships were awarded to students who attended schools where three or more fellowships were awarded.
- ✧ Fifty-four percent (54%) of the fellowships were awarded to students in schools where only one fellowship was awarded.

For the MAI Undergraduate Fellowship Program from 1999 to 2003:

- ✧ Eighty-eight (88) fellowships were awarded to students in 33 different institutions.
- ✧ Seventy percent (70%) of the fellowships were awarded to students who attended schools where three or more fellowships were awarded.
- ✧ Eighteen percent (18%) of the fellowships were awarded to students at schools where only one fellowship was awarded.

For the GRO Undergraduate Fellowship Program from 2004 to 2005:

- ✧ Twenty-six (26) fellowships were awarded to students in 23 different institutions.
- ✧ Twelve percent (12%) of the fellowships were awarded to students who attended schools where three or more fellowships were awarded.
- ✧ Eighty-one percent (81%) of the fellowships were awarded to students in schools where only one fellowship was awarded.

In terms of building capacity, graduation rates are a significant metric, as is the number of students who go beyond a baccalaureate degree, and for graduate students, the number of publications in peer-reviewed journals, the number of literature citations, and the number of awards received by principal investigators. Because the GRO programs are still young, little data exist at this time on these metrics. Equally important as a metric, though, is the number of awards to Master's degree applicants compared to the number awarded to Ph.D. degree applicants. For the MAI Graduate Fellowship Program over the period studied, 1999 to 2003, 20 awards were made to Master's degree applicants compared to 10 fellowships awarded to Ph.D. applicants.

In conclusion, the Subcommittee commends EPA for its responsiveness and creativity in developing innovative solutions in meeting the many challenges mandated by the changes in emphasis in the limited competition programs. EPA also is to be commended for its outreach efforts, as judged by the wide array of schools where scholarship and fellowship applicants study. Although the programs are still young, NCER needs to develop a robust system for

measuring the results and outcomes of the programs for which the Center is responsible. The Subcommittee finds this to be an area that needs substantial attention.

IV.3 Resources and Communication Processes and Procedures

This section presents the Subcommittee's findings specific to the GRO Graduate and Undergraduate Fellowship Programs in the areas of resources and communication processes and procedures, respectively. Findings on information management for all three programs are presented in Section II.3.4.

IV.3.1 Resources

The GRO Graduate Fellowship Program is dwarfed by the STAR Fellowship Program. The GRO Graduate Fellowship Program operates with a $1.5 million annual budget and provides 15 fellowship awards each year at approximately $34,000 per fellow. The awardees are selected in limited competitions, with the original goal emphasizing diversity by providing research opportunities for graduate students from minority institutions, often HBCUs or HACUs. Since 2003, the limited competition can no longer consider race or ethnicity, based on a review of the Agency's statutory authority by EPA's OGC. As a result of that review, the current definition for limited competition is that the applicants come from universities that receive limited federal research and development funds. One such institution, Florida International University, has received 23 GRO Graduate fellowship awards in recent years, with only four of those awarded to minority students. The Subcommittee finds that the GRO Graduate Fellowship Program is not working as originally intended.

The GRO Undergraduate Fellowship Program is the poor step-child in EPA's line-up of research fellowship programs. It has been allocated minimal financial and human resources and typically awards just 15 fellowships each year. With a total annual budget of just $650,000, it provides insufficient funding to undergraduate students to encourage them to pursue advanced degrees in environmental fields. From 1997 to 2005, NCER awarded 116 undergraduate fellowships, a process managed by the same 11 FTEs that support the STAR and GRO Graduate fellows.

Like the GRO Graduate Program, the GRO Undergraduate Fellowship Program was initially intended as a limited competition program to reach minority students from HBCUs, HACUs, and schools with Native American student populations. That focus shifted with the 2003 determination that race and ethnicity could not be used as factors in making these awards.

During their undergraduate years, students make decisions about their academic commitment that will lead to a scientific career (or not). NCER's efforts have minimal effect in encouraging students at this point in their career development. With limited human and fiscal resources, only superficial effort has been made to recruit applicants and encourage them to pursue the higher education that would allow them to build careers as environmental scientists and engineers. The Subcommittee finds that there is limited competition for the GRO Undergraduate Fellowship Program, and like the graduate program, it is not working as originally intended.

IV.3.2 Communication Processes and Procedures

The GRO Graduate Fellowship Program, like the STAR Fellowship Program, relies on formal and informal mechanisms of communication with fellows. There are strong systems in place for announcing the availability of awards, and communicating with applicants and, later, with fellows. During their 2 or 3 years as GRO Graduate fellows they have informal interaction with NCER staff that supplements the contractual agreements and biennial meetings held jointly with STAR fellows.

NCER has made minimal effort to market the GRO Graduate Program, but has had sufficient applications without expending substantial marketing effort. The targeted institutions (those that have limited federal research and development funds) are notified and the word is disseminated on campus. This low-key approach has produced sufficient applications that are rated excellent or very good, to allow EPA to award 15-20 new fellowships each year. Rolling this program into the STAR Fellowship Program would change little in the processes and procedures used for communication with the fellows, within EPA, or with others outside the Agency.

One recommendation in Section III.4 of this report is that NCER use aggressive marketing efforts to create a truly diverse applicant pool for the STAR Fellowship Program, by focusing on publications and meetings of professional societies whose membership is largely composed of scientists and engineers of color, and undertaking targeted recruiting to increase diversity, using data available from the NSF and other sources. This effort hopefully would make the STAR Fellowship Program more diverse, without continuing to support the limited competition method that no longer is working in the GRO Graduate Program.

The GRO Undergraduate Program is a closely-held secret—NCER has failed to spread the word about this opportunity. It has few applicants annually and only a total of 116 awards have been made since 1997, when NCER assumed management responsibility of the program. Most years, there are about 45 applications from across the country, of which about 15-20 are rated excellent or very good, and 15 awards are made each year. At present, there is very little margin between the qualified applicants and the awards given.

Communication with the undergraduate fellows seems adequate at a basic level—in reaching the awardees, providing contractual mechanisms for payments, and related administrative tasks.

IV.4 Recommendations for the GRO Graduate and Undergraduate Fellowship Programs

In Section II.4, the Subcommittee recommends a major restructuring of the GRO Graduate and Undergraduate Fellowship Programs. The general recommendations presented in that section are not repeated here. This section summarizes additional recommendations based on the Subcommittee's findings in Sections IV.1, IV.2, and IV.3, which would help EPA improve the programs if such a restructuring is not implemented or if the implementation takes a number of years.

IV.4.1 Recommendations Related to Achievement of Intended Program Purposes

If EPA maintains the existing GRO Undergraduate Program, it should encourage undergraduate fellows to do internships at centers of excellence in addition to EPA laboratories (e.g., other agencies, STAR institutions, NSF Long Term Ecological Research sites, and Association of Ecosystem Research Centers sites.)

IV.4.2 Recommendations Related to Resources

If the GRO programs are maintained, the Subcommittee recommends that EPA review the impacts of its 2003 determination that competition for program awards cannot legally be limited to minority-serving institutions. The effect of this determination, and the redefinition of the program eligibility to include all institutions receiving less than $35 million in federal research and development funding annually, is to dilute the already limited program resources. Other federal agencies such as NSF and NOAA have programs serving minority institutions without such legal concerns being raised. If necessary, EPA should seek legislation to allow a similar focus. EPA also should consider seeking partnerships with other federal agencies to meet its goal of increasing environmental research capacity at minority-serving institutions and minority representation in environmental fields.

IV.4.3 Recommendations Related to Communication Processes and Procedures

EPA should enhance its efforts to increase the number of applicants to the GRO Undergraduate Fellowship Program. If the current program is replaced by the consortia approach outlined in Section II.4, expanded outreach would be a key function of the consortia.

V. REFERENCES

Barrett GW. Closing the ecological cycle: the emergence of integrative science. *Ecosystem Health* 2001;7:79-84.

Barrett GW, Odum EP. The twenty-first century: the world at carrying capacity. *BioScience* 2000;50:363-368.

U.S. Environmental Protection Agency. Evaluation Report. Science To Achieve Results (STAR) Fellowship Program Needs to Place Emphasis on Measuring Results. Report No. 2003-P-00019. USEPA Office of the Inspector General, Washington, DC, 2003.

Pfund C, Pribbenow CM, Branchaw J, Lauffer SM, Handelsman J. The merits of training mentors. *Science* 2006;311:473-474.

National Research Council. The Measure of STAR. Washington, DC: National Academies Press, 2003, 176 pp.

VI. APPENDICES

Appendix A: Charge to the Subcommittee

Charge for the BOSC Science To Achieve Results (STAR)/ Greater Research Opportunities (GRO) Fellowships Subcommittee

1. Objectives

The Office of Research and Development (ORD) is requesting a retrospective and prospective evaluation of three academic fellowship programs: (1) the Science To Achieve Results (STAR) Graduate Fellowship Program; (2) the Greater Research Opportunities (GRO) Fellowships for Graduate Environmental Study Program; and (3) the GRO Undergraduate Fellowships for Environmental Study Program. The objectives of these evaluations are to: (1) determine if the stated program outcomes are being obtained, and (2) provide direction and recommendations for future program operations, policies, and enhancements.

2. Background

a) Statutory Authority

EPA has statutory authority for the fellowship programs under the Safe Drinking Water Act, Section 1442, 42 U.S.C. 300j-1; Toxic Substances Control Act, Section 10, 15 U.S.C. 2609; Federal Insecticide, Fungicide, and Rodenticide Act, Section 20, 7 U.S.C. 136r; Clean Air Act, Section 103, 42 U.S.C. 7403; Clean Water Act, Section 104, 33 U.S.C.; and Solid Waste Disposal Act, Section 8001, 42 U.S.C. 6901.

b) EPA Strategic Plan

The 2003-2008 EPA Strategic Plan encompasses five goals: (1) Clean Air and Global Climate Change, (2) Clean and Safe Water, (3) Land Preservation and Restoration, (4) Healthy Communities and Ecosystems, and (5) Compliance and Environmental Stewardship. Each goal contains an objective to enhance science and research. Typically, the awarding of fellowships most closely supports Goal 4 (Healthy Communities and Ecosystems), Objective 4.5 (Enhance Science and Research). In addition, the Strategic Plan discusses strategies the Agency is applying across all five goals in areas such as science, human capital, innovation, information, homeland security, partnerships, and economic and policy analysis. The fellowship programs indirectly support the Agency's cross-goal strategies as well.[1]

c) STAR Graduate Fellowship Program

The STAR Graduate Fellowship Program was initiated in 1995. Since the inception of the program, approximately 1,125 STAR fellowships, about 100 each year, have been awarded.[2] The stated purpose of the program always has been to encourage promising students to obtain advanced degrees and pursue careers in environmentally related fields. This goal is consistent with the mission of EPA, which includes providing leadership in the protection of public health and the environment. In 2001, funding for the STAR Fellowship Program was eliminated in the FY 2002 budget. Funding was restored in 2003, however, to the original level of about $10 million and has since been stable.

An inherent goal of the STAR Fellowship Program is to have the nation's best and brightest students conduct basic and applied research in environmentally related research areas. Fellows are selected to receive fellowships only after their submissions undergo a rigorous merit review by experts outside of EPA. The association between the research produced by the fellows, and the Agency's long-term and immediate goals, has become increasingly important since the Agency has sought to implement the Government Performance and Results Act (GPRA).

In 2003, the National Academy of Sciences (NAS) evaluated EPA's STAR research grant and fellowship programs.[3] In its report, entitled "The Measure of STAR," NAS concluded that both the STAR extramural grants and fellowship programs were outstanding when compared to similar programs. Most notably, the report found that the STAR Program fills a unique niche by supporting "important research that is not conducted or funded by other agencies," and that it is "directly relevant" to the mission of EPA. In addition, the NAS report concluded, "The STAR Fellowship Program is a valuable mechanism for enabling a continuing supply of graduate students in environmental sciences and engineering to help build a stronger scientific foundation for the nation's environmental research and management efforts."

In 2003, the EPA Office of the Inspector General also evaluated the STAR Fellowship Program.[4] This report recommended that ORD expand the focus of its efforts to include measuring results by conducting internal reviews, selecting meaningful performance measures, and maintaining necessary data on fellowship applicants and recipients. Additionally, the report recommended adoption of certain best practices used by other federal fellowship programs. Many program enhancements have been implemented since this evaluation was completed.

d) MAI/GRO Limited Competition Fellowship Programs

The Greater Research Opportunities (GRO) Graduate and Undergraduate Fellowship Programs are the current versions of ORD's limited competition fellowship programs. The first limited competition fellowships, previously known as the Minority Academic Institution (MAI) fellowships, date back to 1981. The MAI programs were established in response to Executive Order 12320, commonly referred to as the White House Initiative on Historically Black Colleges and Universities (HBCUs).[5] Other White House Initiatives regarding minority institutions followed, and the eligibility for MAI fellowships was expanded to include them as well. The responsibility for managing the Minority Academic Institution (MAI) Fellowship Programs was transferred to NCER when the Center was created in 1995.

In the fall of 2003, upon the advice of EPA's Office of General Counsel (OGC), the eligibility requirements of the programs were broadened, and the name was changed from MAI to GRO. Previously, MAI program applicants were required to attend an HBCU, or other minority-serving institution. As a result of the policy changes, the GRO applicant pool was broadened to include any eligible student attending an accredited college or university in the United States that received less than $50 million in federal research and development money (this level was reduced to $35 million in the 2006 solicitation). According to the OGC, the Agency did not have sufficient statutory authority to limit the fellowship competition to minority academic institutions.

From its inception, the intent of the limited competition program was to build capacity for environmental research at schools and universities receiving limited funds. Until the 2003 policy change, the focus was on building capacity at HBCUs, Hispanic Serving Institutions, Tribal Colleges and Alaskan Native Serving Institutions, and Native Hawaiian Serving Institutions. To date, 116 undergraduate and 122 graduate fellowships have been awarded. As with the STAR fellowship recipients, GRO fellows are selected to receive the awards only after their proposals have undergone a rigorous merit review by experts outside of EPA.

3. Draft Charge

Charge Question 1: The stated purpose of the STAR Graduate Fellowship Program is to encourage promising students to obtain advanced degrees and pursue careers in an environmental field, a benefit to both the public and private sectors. Has the STAR Graduate Fellowship Program produced the desired outcome? Please make recommendations for enhancing the potential for future positive outcomes.

Charge Question 2: The GRO Graduate Fellowship Program, like its predecessor, the MAI Graduate Fellowship Program, is intended to strengthen the graduate environmental research capacity of institutions of higher education that receive limited funding to build such capacity, especially institutions with substantial minority enrollment. Has the GRO Graduate Fellowship Program fulfilled its purpose? Are there barriers or obstacles that prevent EPA from fully reaching this goal? Please make recommendations for enhancing the potential for future positive outcomes.

Charge Question 3: The GRO Undergraduate Fellowship Program, like its predecessor the MAI Undergraduate Program, is intended to strengthen the undergraduate environmental research capacity of institutions of higher education that receive limited funding to build such capacity, especially those with substantial minority enrollment. By providing quality environmental education support for undergraduate students, it was hoped that recipients would pursue careers in environmentally related fields beyond the baccalaureate level. Has the GRO Undergraduate Fellowship Program fulfilled its purpose? Are there barriers or obstacles that prevent EPA from fully reaching its goal? Please make recommendations for enhancing the potential for future positive outcomes.

Charge Question 4: Please review the fellowship recipient selection process and current decision criteria. Do they assure selection of high-quality fellowship recipients performing

scientific research in areas that best support the Agency's mission? Please make recommendations for improvements.

Charge Question 5: Part of ORD's mission is to perform research and development to identify, understand, and solve current and future environmental problems. As such, an inherent outcome of the STAR and GRO Graduate Fellowship Programs is to produce basic and applied research results usable by EPA and others for decision-making and/or policy development. Has this outcome been obtained? How can the programs be enhanced to produce results relevant to environmental protection?

Charge Question 6: Since the inception of the fellowship programs, assuring diversity among fellowship recipients has been a goal of NCER. Please comment on the practices, resources, and effectiveness of the Center's outreach efforts and make recommendations for enhancing the potential for positive outcomes in the future.

Charge Question 7: Please review the fellowship programs' resources, information management, and communication processes and procedures. Are there any recommendations for program improvements or sustainability?

4. Potential Approach to Fellowship Review

- ✧ The Subcommittee Chair will assign review and writing assignments to Subcommittee members in advance of the face-to-face meeting.
- ✧ Hold two conference calls in the two months preceding a face-to-face meeting.
- ✧ Hold a 1.5-day face-to-face meeting in DC.
- ✧ If needed, hold one or two conference calls to complete the draft report the month after the face-to-face meeting.
- ✧ Goal: A report approved by the Subcommittee is available for BOSC Executive Committee discussion/approval at the June 2006 BOSC Executive Committee Meeting.

References:

1. U.S. Environmental Protection Agency. 2003-2008 EPA Strategic Plan: Direction for the Future (available at http://www.epa.gov/ocfo/plan/plan.htm).
2. U.S. Environmental Protection Agency. 1996 EPA Report to Congress: The Science To Achieve Results Program (available at http://www.epa.gov/ncer/publication/archieve/rtpcong.pdf.
3. National Research Council. The Measure of STAR, 2003, pp. 10-11, 55-56, 137-138 (the entire report can be downloaded at http://www.nap.edu/catalog/10701.html).
4. U.S. Environmental Protection Agency. Science to Achieve Results (STAR) Fellowship

Program Needs to Place Emphasis on Measuring Results. OIG Report No. 2003-P-00019, 2003 (available at http://www.epa.gov/oig/reports/2003/ 2003p00019-20030930.pdf).

5. Executive Order 12320 has been superseded by Executive Order 13256, issued by President George W. Bush on February 12, 2002.

Appendix B: BOSC STAR/GRO Fellowships Subcommittee Members

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Appendix C: List of Acronyms

BOSC	Board of Scientific Counselors
CD	Culturally Diverse Academic Fellowships
EPA	U.S. Environmental Protection Agency
FACA	Federal Advisory Committee Act
FII	Fellowship Information Inventory
FTEs	Full-Time Equivalents
FY	Fiscal Year
GPRA	Government Performance and Results Act
GRO	Greater Research Opportunities
HACU	Hispanic Association of Colleges and Universities
HBCU	Historically Black Colleges and Universities
MAI	Minority Academic Institution
NAS	National Academy of Sciences
NCER	National Center for Environmental Research
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council
NSF	National Science Foundation
OGC	Office of General Counsel
OIG	Office of the Inspector General
ORD	Office of Research and Development
STAR	Science To Achieve Results