October 17, 2003

MEMORANDUM

To: **Dr. Warren Washington**
Chair, National Science Board

Dr. Rita R. Colwell
Director, National Science Foundation

From: **Dr. Christine C. Boesz**
Inspector General, National Science Foundation

Subject: **Management Challenges for NSF in FY 2004**

As required by 31 U.S.C. § 3516(d), I am pleased to submit our annual statement summarizing what the Office of Inspector General (OIG) considers to be the most serious management and performance challenges facing the National Science Foundation (NSF). We have compiled this list based on our audit work, general knowledge of the agency's operations, and the evaluative reports of others, such as GAO and NSF's various advisory committees, contractors, and staff.

Because of this year's accelerated financial and performance reporting schedule, we are providing the list in October rather than December. There has been no fundamental change in the challenges this year. I should note, however, that NSF has made progress in addressing the challenges OIG has identified. The 11 specific challenges fall into five general categories, the first four of which are linked to the President's Management Agenda: 1) strategic management of agency resources, 2) improved financial performance, 3) expanded electronic government, 4) budget and performance integration, and 5) program-specific challenges.

1. Strategic Management of Agency Resources

Workforce Planning and Training

Planning for NSF's future workforce needs and training large numbers of temporary staff remains a serious problem. The workload of the agency, as reflected by the number of proposals forwarded to NSF for review, has increased by 36% over the past three years, while the agency's permanent workforce has increased just 3.6% over the past 20 years. Although advancements in technology have enhanced productivity across the board, NSF's rapidly increasing workload has forced the agency to become increasingly dependent on temporary staff and contractors to handle the additional work. For the second year in a row, NSF's Management Controls Committee has cited the grim assessments submitted by the directorates and called human capital "a significant concern."

In addition, we consider NSF's reliance on temporary personnel, particularly in management positions, to be an area of program risk. According to NSF, 59% of the agency's program officers are in a temporary status, such as rotators from research institutions. Managers who serve at NSF on a short-term basis frequently lack institutional knowledge and are less likely to make long-term workforce planning a priority.

NSF's efforts to justify an increase in staff have been impeded by the lack of a comprehensive workforce plan that identifies workforce gaps and outlines specific actions for addressing them. Without such a plan, NSF cannot determine whether it has the appropriate number of people and competencies to accomplish its strategic goals. It was partly for this reason that NSF contracted in FY 2002 for a "business analysis," a multi-year review of its core business processes that will include a human capital management plan. As the business analysis approaches its mid-point, the preliminary assessment provided by the contractor confirms that NSF's current workforce planning activities are limited and identifies opportunities for improvement.

The first draft of the human capital management plan is expected to be only a blueprint for developing a process for managing human capital, containing few specific recommendations that will have near-term impact. According to the project schedule, it will be two more years before the plan will identify the specific gaps that NSF needs for justifying budget requests for additional staff resources. We believe that NSF cannot afford to wait that long to address its workforce issues.

Administrative Infrastructure

NSF's directorates again reported as part of their annual certification of the agency's management controls that some of the resources necessary to administer their responsibilities are inadequate. Travel funds and office space remain scarce, and these shortages impede the ability of staff to properly oversee existing awards. Adequate travel funds are necessary to conduct on-site inspections and monitor large infrastructure projects and other awards. The lack of office space adversely affects staff morale, the recruitment of new staff, and the agency's ability to store sensitive documents. If office space is inadequate at current workforce levels, it will severely constrain the agency's ability to add the staff needed to keep pace with its growing workload and budget.

The agency states that it is addressing these shortages through budget analyses and planning, assessments of space management and allocation, and increased emphasis on innovative approaches. However, 7 of the 10 directorates cited administrative resource shortages as undermining effective management controls and creating significant concern.

2. Improved Financial Performance

Management of Large Infrastructure Projects

Our audit of the Gemini Project in FY 2001 recommended that NSF improve its oversight and management of large infrastructure projects by, among other things, updating and expanding existing policies and procedures. In FY 2002, we released an audit report of the financial management of NSF's large facility projects

that raised additional concerns about their management. The audit, which was conducted at the request of Congress, found that NSF's policies failed to ensure 1) that the projects remained within authorized funding levels and 2) that accurate and complete information on the total costs of major research equipment and facilities was available to decision makers. NSF responded that it would combine corrective actions recommended by this audit with those initiated as a result of the earlier Gemini audit.

During the past year NSF has continued to make gradual progress toward completing the corrective action plans. Thus far, the agency has implemented approximately half of the original recommendations, including providing guidance to staff for charging expenditures to the proper appropriations account. In June 2003, NSF hired a new Deputy Director for Large Facility Projects, and in July the agency issued a Facilities Management and Oversight Guide. NSF has also begun to offer Project Management Certificate Programs through the NSF Academy to help program officers improve their skills in managing large facility projects.

Nonetheless, key actions remain incomplete. Although the agency is planning supplements to the Facilities Management and Oversight Guide, it does not yet address the problem of recording and tracking the full cost of large facility projects, and it needs to contain more practical guidance for staff who perform the day-to-day work. A systematic process for reporting and tracking both the operational milestones and the associated financial transactions that occur during a project's lifecycle, particularly those pertaining to changes in scope, is still needed. Finally, staff involved with large facility projects need to be trained on the revised policies and procedures that affect funding, accounting, and monitoring.

Post-Award Administration

While NSF has a proven system for administering its pre-award and award disbursement responsibilities, the agency still lacks a comprehensive, risk-based program for monitoring its grants once the money has been awarded. As a result, there is little assurance that NSF award funds are adequately protected from fraud, waste, abuse and mismanagement. Recent audits of high-risk awardees, such as foreign organizations and recipients of Urban Systemic Initiative (USI) grants, confirm that in the absence of an effective post-award monitoring program, problems with certain types of grants tend to recur.

In FY 2002, NSF reviewed 35,165 proposals in order to fund 10,406 grants and cooperative agreements. Given the amount of work required to process an award, NSF is challenged to monitor its $18.7 billion award portfolio (including all active multi-year awards) for both scientific accomplishment and financial compliance. Booz-Allen and Hamilton estimates that program officers spend just 23% of their time on award management and oversight activities and that program directors commit only 12% of their time to these efforts. During the FY 2001 and 2002 audits of NSF's financial statements, weaknesses in the agency's internal controls over the financial, administrative, and compliance aspects of post-award management were cited as a reportable condition.

NSF management has recognized these concerns and is taking steps to improve its award administration and monitoring activities. The agency has

developed a risk assessment and award-monitoring document to provide guidance to staff responsible for tracking the financial aspects of awards. Using this guidance, NSF has begun to identify awardees requiring a higher level of oversight and to perform on-site evaluations of their activities. NSF has also included award management and oversight as a core business process to be evaluated in its agency-wide business analysis.

While these actions are encouraging, more needs to be done. NSF should provide more detail in its Risk Assessment and Award Monitoring Guide to ensure both comprehensive and consistent award monitoring activities. In addition, NSF's current practices should be strengthened by increasing the application of simple, cost-effective monitoring tools, such as periodic telephone calls to monitor performance and provide technical assistance, random desk reviews to ensure compliance with reporting requirements, and comparisons of financial and progress reports to proactively locate potential problems. Finally, NSF would benefit from better oversight coordination between its program officers and financial and grants managers to ensure effective sharing of information and action to address compliance issues.

Cost Sharing

Cost sharing refers to the contribution of financial or in-kind support by recipients of federal grants to the cost of their research projects. In the past, NSF program officers have usually requested cost sharing to help determine an awardee's commitment to a project and to leverage federal support of research. Federal guidelines require that the accounting of cost-shared expenses be treated in a manner consistent with federal expenditures. However, our past audit work indicates that many awardees do not adequately account for or substantiate the value of cost-shared expenditures, raising questions about whether required contributions are actually being made.

During the past year NSF has employed a dual strategy for dealing with this challenge. First, NSF has changed its policy to require cost sharing above the statutory requirement only when there is tangible benefit to the awardee, such as a facility that will outlast the life of the research project or income derived by the awardee as a result of the research. The agency also states that it is providing greater oversight in the risk assessment protocol and site reviews. It is too early to determine whether the change in policy is having the intended effect -- reducing cost-sharing not required by statute or program solicitation -- or to assess the effectiveness of the new risk assessment protocol. However, increased funding for travel will be needed to implement the site reviews associated with the new risk protocol, and several NSF directorates recently reported that the resources available for travel were inadequate (see Administrative Infrastructure).

3. Expanded Electronic Government

Information Security

The challenge for NSF is to implement a security program that protects key information and information systems against unauthorized access, misuse, and corruption, while maintaining the open and collaborative working environment

necessary to carry out NSF's mission. Despite having made significant progress strengthening information security over the past few years, the recent hacking of the U.S. Antarctic Program's operations center in a high-profile but unsuccessful extortion attempt is a dramatic example of how vulnerable some parts of NSF's network remain to this persistent threat.

NSF's Management Controls Committee describes IT security as a significant concern in the wake of recent regional electrical blackouts, disruptions to NSF's computer network, and the demand for improved systems integration from NSF staff. Our FY 2003 review of NSF's information security program identified three significant deficiencies: lack of certification and accreditation of major systems, vulnerabilities in the United States Antarctic Program information systems, and inadequate development and implementation of agency-wide security policies. Although NSF management disagreed with our assessment of the severity of these problems, it agreed with our recommendations and is taking action to correct the problems.

The agency deserves credit for the improvements made to its security program in recent years, including implementation of a mandatory security awareness training program, establishment of an intrusion detection system, formal assignment of security responsibilities and authorities, restructuring of key security positions, appointment of an agency-wide security officer, updated security policies and procedures, and certification and accreditation of most major systems. These accomplishments are evidence of the agency's commitment to information security. However, as information security threats become more aggressive and potentially more destructive, the challenge to NSF's security program will be to provide increasing vigilance, continuous system improvement, and support at all organizational levels to ensure the integrity, confidentiality, and availability of mission critical information and information systems.

4. Budget and Performance Integration

GPRA Reporting

The Government Performance and Results Act (GPRA) was enacted by Congress in 1993 and requires each agency to produce a strategic plan that establishes specific goals against which its performance can be objectively evaluated. Building on the foundation of GPRA, the President's Management Agenda has sought to link program performance with budget decisions about agency funding. To accomplish this goal, the Office of Management and Budget (OMB) has introduced the Program Assessment Rating Tool as a means of integrating an agency's performance and budget.

But for agencies engaged in funding scientific research, GPRA poses a challenge because the benefits of basic research are not easy to measure and may not be evident for years to come. NSF relies in part on Committees of Visitors (COV) to do the difficult work of evaluating its award decisions and providing qualitative data about its performance that is used in GPRA reporting. In the past we have expressed concerns about the lack of validation for the COV information used in NSF's GPRA reports. A recent OIG audit of the COV process found that some COVs do not provide complete responses to questions regarding NSF's

strategic goals and indicators. While NSF acknowledges in its performance report that limitations may exist, it does not discuss the exact nature of the data limitations. OIG recommends that these data limitations be fully disclosed so that users of the information will not misinterpret the data.

The OIG report also notes that NSF has changed how it collects and reviews data for its GPRA performance reporting in ways that raise new concerns about the objectivity of the data collection process. Beginning with FY 2002, NSF established an external Advisory Committee for GPRA Performance Assessment that reviews and assesses NSF's performance in achieving its strategic goals and related performance indicators. The Committee relies heavily on COV reports, and NSF selected "nuggets," i.e., research, engineering, and education highlights, to make its assessments. Since the nuggets are judgmentally selected success stories and do not represent the performance of the entire research portfolio, we believe that their usefulness as a primary assessment tool is limited. If NSF continues to use judgmental sampling, it should clearly disclose and discuss its data collection methodology in order to better inform decision makers and to comply with GPRA's reporting requirements for a complete, balanced, and objective assessment of an agency's performance. Without either a change in its data gathering process or adequate disclosure of the method's limitations, the credibility of NSF's performance reporting is compromised.

Cost Accounting

The requirement to maintain managerial cost information has gained increasing recognition over the years as an important element of an agency's reporting system. It appears in the CFO Act of 1990, and has been a federal accounting standard since 1998. Most recently, the President's Management Agenda requires an effective accounting and reporting system in order to successfully integrate budget and performance information. The measurement and comparison of inputs to outputs is fundamental to any meaningful organizational evaluation. However, at present, NSF's information systems do not readily provide basic cost accounting information needed to link its costs to its program performance. The agency is only just beginning to focus on developing a cost accounting system that will enhance its management information systems and GPRA reporting.

The FY 2002 Management Letter Report notes that NSF's financial and award systems do not track or maintain cost data for its programs and projects, and costs incurred under different funding sources are not linked to provide program officers with information to monitor the full cost of a program or project. The FY 2000, 2001 and 2002 Management Letter Reports accompanying the annual financial statement audit reports recommended that NSF identify management cost information needs for its programs, activities and projects; establish output and outcome goals for each; and develop and report cost efficiency measures that align costs with output and outcome goals. Although NSF management plans to institute cost-measurement practices, they have stated that they must first work with the Office of Management and Budget to define NSF programs in order to establish a system for identifying and measuring the cost of these programs.

5. NSF Program-Specific Challenges

Management of U. S. Antarctic Program

The U.S. Antarctic Program provides the means by which American scientists are able to conduct polar research. Last year, the USAP sponsored nearly 700 researchers conducting 141 projects. Through its contractors, the USAP also operates the three U.S. year-round stations in Antarctica at McMurdo, Amunsden-Scott South Pole, and Palmer, as well as two research vessels. Two thousand civilian contract employees and U.S. military personnel support the work of the Antarctic scientists. NSF's contract for Antarctic support is both costly and complex. The contractor must have technical expertise in a variety of disciplines (medical, environmental engineering, etc.) and is responsible for managing a number of subcontractors in the U.S. and overseas. Therefore, it is important that NSF closely monitor the programmatic and financial performance of this large contract.

The oversight of the United States Antarctica Program remains an ongoing challenge for NSF in part because of its responsibility for the safety and good health of the more than 1000 scientists and contractors that work there during the year. When Antarctic-based personnel become ill questions are raised about whether additional measures can be taken to protect workers in Antarctica from being subjected to unnecessary risks. To address these questions, our office performed an audit of the occupational health and safety, and medical programs established by the USAP contractor.

We found that in general these programs are effective in protecting the health of Antarctic scientists and support staff. However, the audit report notes that facilities and infrastructure at the Antarctic research stations are deteriorating from age and use, and it recommends developing a life-cycle oriented capital asset management program that would serve as support for a dedicated line item (funding source) in its Research and Related Activities budget request. Also, the aged condition of the USAP's physical infrastructure was mentioned by two external committees charged with reviewing the USAP since 1997, and poses a potential health and safety hazard to the men and women who work in the harsh polar environment.

Broadening Participation in the Merit Review Process

A key NSF strategy is to broaden participation and enhance diversity in all NSF activities involving researchers, educators, and students. NSF reported both successes and frustrations in achieving their objectives over the past year. Significant gains have been made in attracting more proposals from women and minorities. Proposals from female PIs increased by 13% in 2002, while proposals from minority PIs have gone up by 29% over the past two years. NSF reported that they have expanded the use of seminars and workshops, focusing on underrepresented minorities, minority serving institutions, and geographic regions that have not in the past received major research support from the government.

However, the number of minority awards remains a relatively small percentage of the total number of awards (5%), and the percentage has only increased slightly over the past 8 years. In addition, NSF continues to lag in its attempts to track

diversity among reviewers participating in the merit review process. Increasing the number of minority reviewers is considered an effective means of promoting increases in the number of proposals from and awards to minority PIs. Demographic information was volunteered for only 3,507 out of a total of 37,943 distinct reviewers. NSF intends to continue its efforts to identify new reviewers from underrepresented groups, but states that it cannot require reviewers to provide demographic information.

Math and Science Partnership

In spite of the significant amount of money invested by the federal government in programs to improve K-12 education, the Nation's Report Card and other evaluations of math and science education continue to indicate that achievement gaps still exist between American schoolchildren and their foreign counterparts. The Math and Science Partnership Program was established to promote partnerships between state and local school districts, and colleges and universities to improve math and science education at the K-12 level. NSF made 23 multi-year awards worth approximately $230 million in FY 2002, and 12 multi-year awards worth approximately $203 million in FY 2003. NSF will fund many of these projects for up to five years.

To be successful, NSF will need to resolve difficult issues such as how best to facilitate partnerships between parties that are not used to working together (e.g., university math and science departments, and local school systems), determining how the success of the projects will be evaluated, and the challenge of monitoring awardees with limited experience in handling federal funds. Although NSF has developed a 6-pronged plan for the oversight and management of MSP awards that includes site and reverse site visits to awardees, use of cooperative agreements for the larger more complex awards, and a contract to develop a substantial overall program evaluation, the plan will be difficult to implement given resource and technical constraints. An audit of specific issues associated with the administration of the program is planned for the fall.

Reporting Requirements

Under the Inspector General Act, we report to the Congress every six months on the following activities:

- Reports issued, significant problems identified, the value of questioned costs and recommendations that funds be put to better use, and NSF's decisions in response (or, if none, an explanation of why and a desired timetable for such decisions). (See p. 5, 45)

- Matters referred to prosecutors, and the resulting prosecutions and convictions. (See p. 23, 57)

- Revisions to significant management decisions on previously reported recommendations, and significant recommendations for which NSF has not completed its response. (See p. 18, 55)

- Legislation and regulations that may affect the efficiency or integrity of NSF's programs. (See p. 9)

- OIG disagreement with any significant decision by NSF management. (None)

- Any matter in which the agency unreasonably refused to provide us with information or assistance. (None)

Acronyms

CFO	Chief Financial Officer
CIO	Chief Information Officer
COI	Conflict of Interest
COV	Committee of Visitors
DA	District Attorney
DACS	Division of Acquisition and Cost Support
DAEO	Designated Agency Ethics Official
DD	Division Director
DFE	Designated Federal Entity
DGA	Division of Grants and Agreements
DOJ	Department of Justice
ECIE	Executive Council of Integrity and Efficiency
FAC	Federal Audit Clearinghouse
FFRDC	Federally Funded Research and Development Center
FOIA	Freedom of Information Act
FY	Fiscal Year
GAO	General Accounting Office
GPM	Grant Policy Manual
GPRA	Government Performance and Results Act
HHS	Department of Health and Human Services
HUD	Department of Housing and Urban Development
IG	Inspector General
IRB	Institutional Review Board
KMS	Knowledge Management System
MIRWG	Misconduct in Research Working Group
MRE	Major Research Equipment
MREFC	Major Research Equipment and Facilities Construction
MSP	Math and Science Partnership
NSB	National Science Board
NSF	National Science Foundation
NSFC	National Natural Science Foundation of China
OIG	Office of Inspector General
OMB	Office of Management and Budget
OPP	Office of Polar Programs
ORI	Office of Research Integrity
OSTP	Office of Science and Technology Policy
PCIE	President's Council on Integrity and Efficiency
PI	Principal Investigator
PFCRA	Program Fraud Civil Remedies Act
QCR	Quality Control Review
SBIR	Small Business Innovation Research
STTR	Small Business Technology Transfer

Acronyms (cont'd)

USAP	United States Antarctic Program
USA/EDVa	United States Attorney, Eastern District of Va.
USI	Urban Systemic Initiative
USP	Urban Systemic Program
VA	Veterans Administration

Organization Chart

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