IV. OTHER REPORTING REQUIREMENTS

OTHER REPORTING REQUIREMENTS

Debt Collection Improvement Act of 1996

Net Accounts Receivable totaled $23,972,447 at September 30, 2004. Of that amount, $23,875,393 is receivable from other federal agencies. The remaining $97,054 is receivable from the public. NSF fully participates in the Department of the Treasury Cross-Servicing Program. In accordance with the Debt Collection Improvement Act, this program allows NSF to refer debts that are delinquent more than 180 days to the Department of the Treasury for appropriate action to collect those accounts. In FY 2004 OMB issued M-04-10 Memorandum on Debt Collection Improvement Act Requirements which reminded agencies of their responsibility to comply with the policies for writing-off and closing-out debt. Based on this memo, NSF has now incorporated the policy of writing-off delinquent debt more than two years old. Additionally, NSF seeks Department of Justice concurrence for action on items over $100,000.

Civil Monetary Penalty Act

There were no Civil Monetary Penalties assessed by NSF during the relevant financial statement reporting period.

Prompt Payment Act

NSF continues to strive for the highest levels of electronic fund transfers (EFT) payments required by the Prompt Payment Act. Payroll, vendor and grantee payment transactions are made by EFT. Only payments made to foreign banks are made by paper check. Our FastLane system utilized for grants enables grantees to draw cash as required for execution of the grant. Interest payments for commercial vendors under the Prompt Payment Act in FY 2004 are $11,360.04.

Cash Management Improvement Act (CMIA)

In FY 2004, NSF had no awards covered under CMIA Treasury-State Agreements. NSF's FastLane system with grantee draws of cash make the timeliness of payments issue under the Act essentially not applicable to the agency. No interest payments were made in FY 2004.

Patents and Inventions Resulting From NSF Support

The following information about inventions is being reported in compliance with Section 3(f) of the National Science Foundation Act of 1950, as amended [42 U.S.C. 1862(f)]. There were 1,006 NSF invention disclosures reported to the Foundation either directly or through NIH's iEdison database during FY 2004. Rights to these inventions were allocated in accordance with Chapter 18 of Title 35 of the United States Code, commonly called the "Bayh-Dole Act."

Management Challenges

As required by the Reports Consolidation Act of 2000, the following is the Inspector General's memorandum addressing NSF's FY 2005 management challenges. It is followed by the Director's response and a report on actions the Foundation has undertaken in the past year with respect to management challenges identified by the IG in FY 2004.

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
ARLINGTON, VIRGINIA 22230

OFFICE OF
INSPECTOR GENERAL

October 15, 2004

MEMORANDUM

To: Dr. Warren Washington
            Chair, National Science Board

            Dr. Arden Bement
            Acting Director, National Science Foundation

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

Subject: Management Challenges for NSF in FY 2005

       In accordance with the Reports Consolidation Act of 2000, I am submitting 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.

       The challenges are unchanged from last year, mainly because they reflect areas of fundamental program risk that continue to pose obstacles to NSF's accomplishment of its mission. They will therefore require ongoing attention from NSF management over the long term. We have duly noted NSF's progress over the last year on many of the challenges listed, although much remains to be done.

       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.

If you have any questions or need additional information, please call me at 703-292-7100.

1. Strategic Management of Agency Resources

<u>Workforce Planning and Training</u>

Workforce planning continues to be one of the most serious challenges facing NSF. Since 1999 the number of proposals processed has increased by 40 percent, while the number of program officers assigned to their review has remained relatively flat. Last year alone, the number of proposals increased by 14 percent to 40,075, the largest annual percentage increase in over a decade. The quantity of proposals transmitted to NSF is perhaps the single best indicator of its overall workload. According to NSF, program officers now spend 55 percent of their time on merit review, leaving less time available for other important responsibilities such as award management and oversight and program planning[1].

NSF's reliance on "non-permanent" personnel is another area of concern. Forty-seven percent of NSF's 700 science and engineering staff are either visiting personnel, temporary employees, or intermittent employees. Visiting personnel make an important contribution to NSF's mission by enabling the agency to refresh and supplement the knowledge base of its permanent professional staff. But managers who serve at NSF on a temporary basis frequently lack institutional knowledge and are less likely or able to make long-term planning a priority. In fact NSF's *Business Analysis* project (a multi-year review aimed at reengineering the agency's core business processes) reports that NSF in general is spending less time on forward-looking activities such as strategic planning and program development. Moreover, there are administrative costs that NSF incurs in recruiting, hiring, processing, and training personnel that rotate every 1 to 4 years. In FY 2004, we conducted an audit that identified the additional salary, fringe benefits, travel and other costs of visiting or temporary personnel, and found three areas where NSF could improve its administration of the programs[2]. Therefore, while visiting personnel are an important resource for NSF, the agency must continually balance the benefits of their services against the additional costs involved.

The agency's response to these and other workforce issues is being formulated as part of the *Business Analysis*, which is scheduled for completion by the end of FY 2005. In FY 2004, NSF initiated an agency-wide workforce planning effort based on the findings of the business analysis to date. NSF's Human Capital Management Plan, which was delivered in December 2003, integrates and links Human Capital activities to the NSF business plan and to the Human Capital Assessment and Accountability Framework provided by the Office of Personnel Management. While the current plan provides a roadmap for identifying NSF's future workforce needs, the needs themselves are still in the process of being defined.

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[1] Report to the National Science Board on NSF's Merit Review Process FY 2003 (May 2004)

[2] Audit of Costs Associated with Visiting Personnel, July 23, 2004, OIG 04-2-006. Opportunities for improvement cited in the report include consulting income documentation, IPA pay computations, and VSEE cost of living adjustments.

<u>Administrative Infrastructure</u>

A shortage of administrative resources continues to hinder NSF's staff from keeping pace with its growing workload. NSF states that over the past year it has leased an additional 26,576 square feet of space and the travel budget increased from $4.32 million in FY 2003 to $6.05 million in FY 2004 to support the merit review process and increase oversight activities. Management reports that it conducts ongoing assessments of space management and allocation in addition to its regular budget analysis and planning activities. It also encourages video conferencing and telecommuting as methods of leveraging scarce administrative resources.

While these efforts provided some relief, more than a third of the management control weaknesses cited by NSF's managers in the agency's FY 2004 controls assessment involves a shortage of human or administrative resources. Space remains a critical issue, impeding the recruitment of quality staff and the ability to store sensitive documents. In some cases, program officers are sharing cubicles, while contractors are located in file rooms. Travel funds were repeatedly cited as inadequate for the purpose of properly overseeing existing awards. NSF must make it a priority to allocate more of its funding for administrative resources in order to maximize the effectiveness of staff.

2. Improved Financial Performance

<u>Management of Large Infrastructure Projects</u>

NSF's investment in large facilities and infrastructure projects presents management with a number of budgetary and operational challenges. The construction of projects such as telescopes, research equipment, supercomputing databases, and earthquake simulators are inherently risky due to their complex design, cutting-edge technology, and expense. A disciplined project management approach is essential to success; at the same time, modifications are sometimes necessary when developing a new technological tool. NSF spends approximately $1.1 billion a year on these scientific tools, with many of the projects costing as much as several hundred million dollars each.

NSF continues to make measured progress towards addressing the recommendations we offered during two past audits of large facility projects[3]. Our audit reports identified the need to improve oversight of large projects by enhancing organizational accountability, providing better guidance (particularly in the area of financial management), and improving NSF's systems to capture complete information about project costs. During the past two years, NSF has hired a Deputy Director for Large Facility Projects and developed more detailed guidance to support its *Facilities Management and Oversight Guide.*

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[3] Audit of the Financial Management of the Gemini Project, December 15, 2000, OIG 01-2001
Audit of Funding for Major Research Equipment and Facilities, May 1, 2002, OIG 02-2007

However, we remain concerned that NSF does not have adequate staff assigned to oversee and manage large projects, and that those assigned may not have sufficient resources or authority to carry out their responsibilities. In addition, many of the modules intended to support the *Facilities Management and Oversight Guide* are still under development, including those pertaining to financial management. Finally, the problem of recording and tracking the full costs of projects has not yet been addressed. A contract to enhance the financial system for tracking life cycle costs of Major Research Equipment and Facilities Construction projects was awarded at the end of FY 2004.

Post-Award Administration

Since FY 2002, independent audits of NSF's financial statements have cited weaknesses in the agency's post-award monitoring of grantee institutions as a major deficiency. An effective post-award monitoring program should ensure that: awardees are complying with award terms and conditions and federal regulations; adequate progress is being made toward achieving the objectives and milestones of the program; and expenditures listed on NSF's financial statements are accurate. While NSF has taken some steps over the past three years toward establishing a risk-based program for post-award monitoring of its grants, more needs to be done. NSF must broaden its approach to award monitoring to go beyond high-risk awardees, develop more effective award oversight guidance, and increase the coordination between program and financial officers.

In FY 2004, NSF reorganized the Office of Budget, Finance and Award Management to establish the Division of Institution and Award Support. The Division's role is to manage federal funds awarded by NSF, including providing financial and administrative assistance to institutional awardees and NSF directorates to implement business models, processes and practices. In addition, NSF has increased its outreach to at-risk institutions and developed creative ideas for partnering with other agencies to monitor common grantees. Together these actions represent progress toward addressing post-award administration issues at NSF.

However, NSF's approach to post-award administration focuses too narrowly on high-risk awardees. Because the agency considers only 42 out of its 34,011 awards to be high-risk, the impact of the Award Monitoring and Business Assistance Program (AMBAP) is effectively limited to 0.1% of its award portfolio. To broaden the scope of its activities, NSF should apply more cost-effective monitoring procedures such as desk reviews of reports from awardees and computer-assisted screening to medium and low risk awardees on a random basis.

NSF also issued an award-monitoring guide in FY 2002 and a revised site-visit guide in FY 2003 for agency staff; however, both guides need improvement. In an assessment of NSF's post-award monitoring efforts, IBM Business Consulting commented, "the staff did not follow or only loosely followed the AMBAP guide noting that it was too broad and extensive to be implemented in a realistic timeframe." Meanwhile, the site visit guide does not address many important details for conducting a

review, such as how and what types of reviews should be conducted, and therefore does not assure quality or consistency.

The site-visit guide does not standardize documentation for performing or recording the results of the review, thereby increasing the risk that procedures may not be consistently applied. IBM noted that this lack of documentation undermined the follow-up of site visits, and recommended standardized procedures for writing the report, following up, and maintaining documentation in a database for analysis of overall findings. Furthermore, in a recent audit report we cited close coordination between the program and administrative offices as an effective practice of organizations engaged in post-award monitoring and oversight[4]. NSF should seek to develop one comprehensive approach to award monitoring that would include both a financial and programmatic component.

Finally, the Improper Payments Improvement Act of 2002 requires agencies to review all programs and activities annually and identify those that are susceptible to significant improper payments. In May of 2003, the Office of Management and Budget (OMB) issued guidance requiring agencies to statistically sample those programs at high risk for improper payments and establish baseline error rates and improvement targets for future reporting. NSF, like other grant making agencies, is challenged to implement the OMB requirements. Since improper payments include those made by NSF's awardees and subawardees, designing a methodology to statistically sample the voluminous number of payments made by NSF's 2500 awardees is complex.

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. 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.

Two years ago, NSF 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. There is evidence that the new policy has effectively curtailed new cost sharing agreements. The number of new awards that include cost sharing declined from 3346 in FY 2001 to just 1556 during FY 2004. During the same period, the amount of promised cost sharing declined by 54 percent. Less cost sharing reduces the potential for compliance problems and the burden on the agency for correcting them.

While reducing cost sharing requirements mitigates the challenge, it does not eliminate it since some cost sharing is required by statute and some is voluntary. The agency states that it is providing greater oversight in the risk assessment protocol and site

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[4] Management Framework: Award Monitoring; September 30, 2003; OIG 03-2-015

reviews. Cost sharing is also identified as a high-risk factor and a focus of the new protocol. It is too early to assess the effectiveness of these efforts. In October, the agency acted to eliminate future cost sharing except for what is required by statute. The policy is likely to further reduce the amount of cost sharing entered into by the agency but to what extent is not known. We will continue to monitor the substantial amount of cost shared funds still outstanding and reassess changes brought about by the new policy.

3. Expanded Electronic Government

<u>Information Security</u>

NSF must have a comprehensive and effective information technology (IT) security program both to meet Federal requirements and to mitigate risks that threaten the successful operation and development of its IT systems. These systems and the information they contain need to be protected from unauthorized access, use, disclosure, disruption, modification, and destruction. Over the past several years, NSF has taken a number of steps to strengthen its IT security program. For example, it formed a Security Working Group comprised of managers from across the agency to set NSF policy and procedures, and established a new security office to implement them. All staff are required to complete security awareness training each year. NSF has undertaken penetration testing of its systems in order to find and address vulnerabilities more quickly. In addition, the agency completed the certification and accreditation of 18 of its 19 general support systems and major applications by the end of FY 2003, and in FY 2004 began a triennial cycle of recertification of all systems. Also in FY 2004, the Office of Polar Programs completed a comprehensive inventory of the systems supporting the U.S. Antarctic Program (USAP), classifying them as one general support system and two major applications, rather than one major application as they had been classified in 2003. The agency plans to certify and accredit those systems by the end of CY 2004,

Despite these accomplishments, IT security is an ongoing challenge for NSF, as for all federal agencies, and some weaknesses remain. The OIG's FY 2004 Federal Information Security Management Act (FISMA) report issued on June 30, 2004, noted that the systems serving the USAP still had not been certified and accredited, information security policies had not been established and implemented, and required background investigations for key information security personnel had not been performed. Our review also found that NSF had not updated its risk assessments and security plans to account for the migration of its payroll and personnel systems to another federal agency, NSF's disaster recovery plan had not been fully tested, and access controls could be strengthened. These vulnerabilities could result in unauthorized access to and modification of financial, programmatic, and other sensitive information; loss of assets; health and safety risks; and disruption of critical operations and the ensuing costs associated with business downtime and recovery. NSF has reported that it has made significant progress in all these areas since our review.

4. Budget and Performance Integration

GPRA Reporting

Congress enacted the Government Performance and Results Act (GPRA) in 1993 as a means of making government more results oriented. The Act requires each agency to develop a strategic plan that establishes specific goals against which its performance can be objectively evaluated. To further focus government agencies on results, the President's Management Agenda requires that performance be considered in funding and management decisions and that programs work toward continual improvement. In support of these objectives, OMB introduced the Program Assessment Rating Tool (PART) to provide a framework for evaluating performance and generate program effectiveness ratings for Congress to consider when making budget decisions.

GPRA poses a significant challenge to agencies involved in science or education research because the benefits are difficult to measure and may only become apparent over time. Moreover performance measures must be carefully formulated so as not to discourage appropriate high-risk research that offers the potential for a "transformational" discovery. Because of the complexity involved in measuring the benefits of research, a full discussion of the methodology employed in reporting performance results should be prominently included in each performance report. Last year we issued an audit report on the Committee of Visitors panels that are used by NSF to provide qualitative data for GPRA reporting. We found that some of the limitations associated with the use of the data were not fully disclosed in the agency's GPRA report. Further, we noted that NSF relied on judgmentally selected "nuggets" (research success stories) as evidence that it has achieved its GPRA goals, again without full disclosure. Our report indicated that a user of NSF's performance report might infer that the nuggets are representative of the performance of the entire portfolio, and the credibility of the reports could become compromised. We recommended that NSF more clearly disclose the limitations associated with both issues.

In FY 2004, NSF has expanded its disclosure of the methodology it employed and while this disclosure has resolved the issues raised in the audit report, we continue to believe NSF should report on the performance results of its entire research portfolio. To do this, NSF will need to develop a knowledge management system to capture, categorize and analyze the research results.

Cost Accounting

An effective accounting and reporting system is essential to attaining the objectives of the President's Management Agenda and complying with GPRA. However, NSF's current information systems do not readily provide the cost accounting information necessary to link its costs to program performance. While NSF has been a leader in generating annual financial statements that have received "unqualified" audit opinions for the past six years, it is only beginning to focus on developing a cost accounting system to address its program performance evaluation and reporting needs.

For the past four years, each financial statement audit has recommended that NSF identify management cost information requirements for each organizational unit or program, establish activities/projects and corresponding outcomes within each unit, and develop and report cost efficiency measures that align with outputs and outcome goals. The auditors have also noted that NSF's systems do not track complete cost data for projects in which the costs are borne by more than one NSF directorate or organizational unit. Consequently, program officers cannot monitor the full cost of a project.

In FY 2004, NSF management developed a Budget, Cost and Performance Integration (BCPI) work plan that was approved by OMB. The agency states that cost accounting is a key element of the BCPI plan. A crosswalk was developed between the costs accounted for in the appropriations reporting system and those in the new programmatic reporting framework. When NSF is able to interface the crosswalk with the Financial Accounting System, the agency will be able to identify the full direct costs of its programs and projects, including its large facility projects. However, the plan does not provide for tracking costs of NSF's internal business processes and activities such as the cost of soliciting grants, conducting merit reviews, or performing post-award grant administration. Identifying the costs of these internal functions is important for evaluating NSF's performance accomplishments under its organizational excellence strategic goal.

5. NSF Program-Specific Challenges

Management of U. S. Antarctic Program

As part of its mission, NSF finances and supports Antarctic research, providing over $197 million in FY 2004 for research activities in Antarctica. Its single largest award is a contract for Antarctic logistics and support services valued at $1.116 billion over 10 years. Each year the United States Antarctic Program (USAP) deploys about 700 people to the continent to perform scientific research and another 2,500 to provide logistics in support of this research, including the operation and maintenance of year-round research stations. Those deployed include research teams from academia, industry, and government, military personnel, and contractor employees.

NSF's contract for Antarctic support contains many inherent risks and complex requirements. The contractor must have technical expertise in a variety of disciplines, including medical and environmental engineering, and is responsible for managing a number of subcontractors in the U.S. and overseas. Therefore, NSF's oversight of the programmatic and financial performance of this large contract is itself a formidable challenge, requiring considerable administrative and technical skill. The remote and harsh Antarctic landscape leaves little margin of error for many basic support activities. For example, weaknesses in the USAP information system were cited as a reportable condition during the agency's most recent IT audit since they could potentially disrupt essential life support or science activities. The agency also has yet to resolve an outstanding recommendation from an audit report issued last year aimed at strengthening

the USAP's capital asset management program and renewing its aging infrastructure. The issue involves how best to assure funding is available to maintain the infrastructure in a timely manner. NSF comments that it has sustained an ongoing effort to maintain and upgrade facilities at McMurdo and Palmer Stations, albeit at a slower pace than is ideal, and affirms that the USAP is providing a safe and healthy environment.

A recent audit identified instances of overbilling by the contractor. Consequently, the OIG is planning to conduct a financial and compliance audit of the Antarctic Logistics and Support Contractor that will include a review of internal controls over cash management and compliance with various fund restrictions. We will also continue to monitor its information systems.

Broadening Participation in the Merit Review Process

The merit review process is a cornerstone of NSF's operations, ensuring the integrity and fairness of the proposal review process and maintaining the high standards of excellence for which NSF is known. NSF was able to fund only 27 percent of the more than 40,000 proposals it received in FY 2003. The agency decides which research, engineering and education projects to fund by subjecting most proposals to a rigorous merit review process that ensures each will receive knowledgeable and unbiased consideration based on specific criteria. It is largely through the merit review system that NSF adds value to the national research and education enterprise. One objective in NSF's Strategic Plan is to increase the participation of underrepresented groups and institutions in all NSF programs and activities, including merit review. Developing the untapped potential of underrepresented groups should lead to expanded individual opportunity and improved national competitiveness and prosperity.

During FY 2003, the percentage of underrepresented groups that received awards remained steady, with female and minority PIs funded at approximately the same rate as the overall proposer population. The number of awards made to minority PIs remains at 5 percent of total awards. Beginning in FY 2001, NSF started requesting demographic data from all merit panel reviewers to determine the extent of participation of underrepresented groups in the NSF reviewer population. However, NSF cannot legally require reviewers to provide demographic information. In FY 2003, out of a total of 40,020 reviewers who returned reviews, only 5,336 provided demographic information. Thirty-four percent of those indicated they were members of an underrepresented group. In FY 2004, NSF continued to use seminars and workshops at minority-serving institutions in an effort to expand interest in NSF's programs. Reviewer diversity is emphasized through the use of a large and expanding Foundation-wide reviewer database, explicit policy guidance, mandatory training for all program officers, and directorate-level initiatives. The agency will also continue to request demographic information and adjust the FastLane reviewer module to make it more convenient for reviewers to provide such information.

Math and Science Partnership

 NSF has responsibility for the Math and Science Partnership (MSP) program, a key element of the President's initiative, *No Child Left Behind*, aimed at strengthening and reforming K-12 education. In FY 2002 and 2003, NSF awarded a total of $280 million to fund partnerships between school districts, colleges and universities, and other organizations for the purpose of improving math and science education at the K-12 level. NSF has requested an additional $80 million to support ongoing activities of the MSP program in FY 2005. The program poses several challenges for NSF, including the need to facilitate partnerships among institutions that do not normally collaborate, monitor awardees that are unaccustomed to handling federal funds, and ensure that projects are implemented as proposed and have effective evaluation plans that adequately report their impact on student achievement.

 In a recent report, we reviewed the evaluation plans for nine of the first 23 MSP projects and found that five had effective evaluation plans. The other four projects in our sample were missing key elements of an effective evaluation process. In response to this finding, NSF plans to enlist the help of evaluation experts to frame a statement of practice to serve as a framework for current and future MSP award recipients. We also recommended that the agency develop a comprehensive management plan for evaluating the MSP program. An award for an external evaluation of the MSP program consistent with the research and development nature of the program was recently made.

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

November 3, 2004

OFFICE OF THE
DIRECTOR

MEMORANDUM

To: Inspector General, NSF

From: Acting Director, NSF

Subject: Response to the Inspector General's Memorandum on Management
              Challenges for NSF in 2005

Thank you for your memorandum of October 15, 2004 on the management challenges facing
the National Science Foundation in FY 2005.

NSF has a strong record as an efficient and effective organization and continues to build on
that tradition. As reflected in our strategic goal for organizational excellence, the
Foundation's commitment to high standards applies to its business processes, just as it does
to its investments in science, engineering and education. Success in achieving our mission
is widely acknowledged. The Foundation's Advisory Committee for GPRA Performance
Assessment recently reported that NSF's accomplishments in its organizational excellence
goal demonstrate innovation in business processes and attention to continuous improvement
in management effectiveness. The President's management scorecard continues to
recognize "green lights" for NSF in financial management, electronic government, and R&D
investment criteria.

NSF faces an increasing, and increasingly complex, workload. Such challenges are inherent
at the frontiers of research and education. The Foundation employs a robust process for
identifying and addressing demands on agency staff and systems. Actions undertaken in
FY 2004, detailed in the attached report on management challenges, reflect a significant
investment of time, effort and resources.

In FY 2005, we will continue to address management challenges based on priority and
urgency. We are guided by our long-standing practice of executing a sound, reasoned
approach as efficiently as possible, assured that NSF staff commitment to the agency's
mission maximizes the Foundation's effectiveness and performance.

Arden L. Bement, Jr.

Attachment

cc: Chair, National Science Board

Attachment

NSF Management Challenges for FY2004 — Agency Actions

NSF MANAGEMENT CHALLENGES FOR 2004

MANAGEMENT CHALLENGE	AGENCY ACTIONS

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.

[OIG Memorandum October 17, 2003: Management Challenges for NSF in FY 2004]

Management embraces workforce planning and training as an exciting challenge. We have chosen not to react hastily to the significant increase in applications and corresponding workload, believing that a hasty response to a complex problem is rarely a wise course of action. NSF is engaged in a multi-year strategic business analysis, which is examining organizational alignment, workforce size, skill mix, potential gaps, and deployment necessary to ensure mission accomplishment. This analysis began in July 2002, and is expected to continue through the end of FY 2005. As part of this effort, NSF is developing and implementing human capital strategies, which address both the needs of the organization and the overall concerns of the President's Management Agenda. Management believes this is the most responsible approach to planning for NSF's future workforce needs.

NSF's Human Capital Management Plan (HCMP) integrates and links Human Capital activities to the NSF business plan and to the Human Capital Assessment and Accountability Framework as provided by the Office of Personnel Management. NSF is measuring its progress quarterly on the action strategies contained in the HCMP. In FY 2004, NSF initiated an agency-wide workforce planning effort based on the findings of the business analysis to date. In addition, several studies that are part of the business analysis, such as the Electronic Jacket Human Capital Pilot and the Administrative Functions Study, promise to provide meaningful results for NSF in FY 2005 on the impact of business processes changes on the workforce.

Management's difference of opinion with the OIG on the issue of agency use of rotators is well documented. Management does not agree that use of IPAs and other rotators and contractors places agency programs at risk. Rather, management believes that the use of rotators at the Foundation is critical to fulfilling NSF's statutory mandate. The National Academy of Public Administration (NAPA) recently endorsed the continued use of both permanent and temporary personnel at NSF. In an April 2003 report,* NAPA noted the value of rotators to the NSF mission, and found that, generally, NSF has the right mix of rotators and career employees. The report recommended that (1) NSF continue to use rotators in the positions of program officers, managers, and assistant directors; (2) NSF continue to balance the number of rotators and permanent employees based on its experience and the specific requirements of individual positions; and (3) the Director establish and support an ongoing management and executive level knowledge sharing program.

Over 70 percent of NSF staff and nearly 50 percent of Science and Engineering staff are permanent. Both rotating and permanent managers at NSF are actively engaged in long-term strategic and resource planning focused on both budget and workforce.

*"National Science Foundation: Governance and Management for the Future," NAPA, April 2004 (pp. 91-115).

MANAGEMENT CHALLENGE	AGENCY ACTIONS

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.

[OIG Memorandum October 17, 2003: Management Challenges for NSF in FY 2004]

Management agrees that administrative resources are constrained at NSF. As reflected in the agency's FY 2004 and FY 2005 budget requests, management is seeking to relieve some of the strain caused by the need for additional office space and travel resources through increased investment in both. To provide relief for some of the most critical space shortages, NSF leased an additional 26,576 square feet of space in FY 2004. To continue to support the merit review process and increase oversight activities – as NSF's science and engineering and research programs continue to emphasize more complex, interrelated sets of activities – the NSF travel budget increased from $4.32 million in FY 2003 to $6.05 million in FY 2004. The FY 2005 Budget Request emphasizes this priority by investing an additional $1.21 million, or 20 percent, for a requested total of $7.26 million.

In addition to budget analysis and planning, management conducts ongoing assessments of space management and allocation, and encourages innovative and creative approaches to work management, such as video conferencing and telecommuting. In FY 2004, NSF and AFGE Local 3403 completed negotiations on a new telework agreement.

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*

Over the past two years, NSF has strengthened every aspect of its management of large facilities.

There are now two permanent staff in the Office of Budget, Finance and Award Management – the Deputy Director for Large Facility Projects (LFP Deputy) and the new Facility Management and Oversight Advisor reporting to the Deputy.

The LFP Deputy meets regularly with program officers for Major Research Equipment and Facilities Construction (MREFC) projects. He participates in site visits, cost reviews and operational reviews, and serves on all internal Project Advisory Teams (PATs) for MREFC projects. The Deputy has established the Facilities Panel, a group of NSF staff with project experience in business or technical oversight, that formally reviews and approves the Internal Management Plans for large facility projects.

The Facilities Management & Oversight Guide, released July 2003, is continually updated to reflect policy changes and lessons learned. It is available at: http://www.nsf.gov/pubsys/ods/getpub.cfm?nsf03049. During FY 2004, additional supporting material was developed providing more detailed information and instruction, including modules on: Roles & Responsibilities of NSF Staff Involved in the Management & Oversight of Large Facilities; Risk Management Guide; Definition & Use of Contingency Resources in NSF Facility Construction; and Guidelines for Development of Project Execution Plans. A module on Financial Management is expected to be released shortly; others will follow.

For training , the LFP Deputy is working with the NSF Academy

MANAGEMENT CHALLENGE	AGENCY ACTIONS
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. [OIG Memorandum October 17, 2003: Management Challenges for NSF in FY 2004]	to provide courses and workshops on project management. Over 180 staff have taken one or more project management training class since 2001, with 46 earning associate certificates and 16 earning masters certificates. The LFP Deputy has also been coordinating with the organizers of the NSF-funded "Project Science" workshop on Large Project Management to define course content and encourage participation by NSF staff and project managers from NSF-funded or proposed large facility projects. Since January 2002, nearly 40 people associated with large NSF projects have taken the workshop (about half NSF staff and half project personnel), and many more are registered for the upcoming workshop in October 2004. In addition, internal seminars are held to share lessons learned in facility management. An internal website on Large Facility Projects provides information with links to all of the facilities, the Facilities Guide and modules, and project management seminars and training opportunities. For fund control and accounting, complete and detailed information about project costs is now routinely included in NSF's annual budget request to Congress. NSF has also strengthened its procedures through issuance of standard operating guidance for handling funds for projects funded through the MREFC account (July 2001) and with sections on Budgeting and Funding in the Guide. A contract to enhance the financial system for tracking life cycle costs of MREFC projects will be awarded before the end of FY 2004.

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	NSF has a proactive approach to integrated award management – incorporating programmatic, administrative and financial oversight – while making the most effective use of limited NSF staff and travel resources. The research and education results emerging from NSF-supported projects demonstrate the effectiveness of programs. A challenge for financial oversight is to ensure accountability while minimizing administrative burden on awardees. Over the course of the last two years, the Office of Budget Finance and Award Management (BFA) has developed and implemented a comprehensive, risk-based program for post-award involvement with awardees. In FY 2004, BFA implemented organizational changes to focus responsibility for award oversight, monitoring, outreach, policy, and systems support within a newly created independent division – the Division of Institution and Award Support – and to realign functional responsibility for NSF grant, agreement and contract awards. BFA also continued improving the Award Monitoring and Business Assistance Program (AMBAP). The AMBAP is an evolving and improving set of practices and procedures for assisting NSF awardees in understanding and complying with both NSF and Federal government award terms and conditions. Within the AMBAP, the Risk Assessment Tool was further refined and modified to address additional risk factors as suggested by the NSF OIG. As a "living" document, the AMBAP guide was also reviewed to address concerns brought up in previously conducted outreach reviews and to incorporate lessons learned as we complete reviews. In March of 2004, an independent assessment was conducted of the Post Award Monitoring program, and our efforts were

MANAGEMENT CHALLENGE	AGENCY ACTIONS
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. [OIG Memorandum October 17, 2003: Management Challenges for NSF in FY 2004]	benchmarked against four comparable Federal agencies - EPA, NIH, DOJ, and ONR. The assessment (based on FY 2003 activities) found that, overall, NSF has a sound post-award monitoring program, providing valuable oversight and assistance to a sample of institutions, based on risk. With respect to risk assessment, the report stated that NSF's risk assessment process to identify high-risk institutions, as part of its monitoring plan, appears to be relatively extensive and comprehensive, compared to other agencies.* Issues identified in the report are being addressed by BFA staff in the reviews conducted in FY 2004. During FY 2004 to date, BFA staff performed 35 Award Monitoring and Business Assistance site visits to awardee institutions. These 35 organizations manage 280 active awards representing $280 million in NSF support. In addition, six on-site visits were performed at the request of NSF program officers and the OIG. Working together, NSF program officers and BFA staff members responsible for post award administration conducted targeted outreach for financial administrative staff for groups such as Engineering Research Centers (ERCs), Native American Indian tribes, and Education and Human Resources (EHR) awardees. These activities included follow-up on award monitoring issues identified in audit reports, reviewing annual reporting requirements and accounting systems for ERCs, and assisting new performing organizations in setting up accounting systems to manage large dollar awards. In particular, the USI program, in collaboration with BFA, has a well defined set of management and oversight activities aimed at reducing risk in the portfolio, including terms and conditions in cooperative agreements; site visits; financial management workshops; regional and national meetings to share lessons learned; conferences on data; research and evaluation studies; and technical assistance/support via contractors. In FY 2004, BFA continued its analysis of Federal Cash Transaction Reports to identify potential problems. These desk reviews allow NSF to determine whether the requested adjustments were for allowable and allocable costs, and whether awardees are maintaining appropriate documentation. The reviews also help to identify organizations that may be having trouble accounting for award expenditures in an accurate and timely manner. In FY 2004, as of mid September, BFA also resolved 163 audit reports. During resolution of these reports, NSF staff – primarily through desk review – reviewed the supporting source documentation and awardee actions taken to address compliance and internal control findings. The internal control findings identified in these reports as requiring NSF action were all resolved. *"National Science Foundation: Post Award Monitoring Assessment," IBM Business Consulting Services, March 2004 (Executive Summary, page 3; p. 76)

MANAGEMENT CHALLENGE	AGENCY ACTIONS

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).

[OIG Memorandum October 17, 2003: Management Challenges for NSF in FY 2004]

Since approval of the revised cost sharing policy by the NSB in November 2002, NSF has taken several steps to implement the revised policy:

- Issued Important Notice 128, *Revision of the NSF Cost Sharing Policy* (January 24, 2003) which addressed:
  - continued existence of the statutory cost sharing requirement;
  - restatement of the principal components of the policy, including the concept of "tangible benefit";
  - guidance to proposers that, if cost sharing is not required by program solicitation, it should not be reflected in the requested budget (Line M); and
  - guidance to proposers that, if the program solicitation did require cost sharing, the proposal should not include cost sharing in excess of the requirement.
- Revised relevant NSF policy documents, e.g., *Grant Proposal Guide* and the NSF *Proposal and Award Manual,* to ensure consistency with the revised cost sharing policy.
- Increased emphasis on review and approval of cost sharing requirements stated in solicitations to ensure compliance with the policy, and clarified boilerplate coverage on cost sharing in program solicitations for clarity of understanding by all parties.
- Masked the cost sharing line on the NSF Budget (Line M) from reviewers to ensure that such cost sharing is not considered in the review process.
- Developed and implemented an electronic capability in FastLane to submit the required annual and final certifications for awards that contain cost sharing in excess of $500,000.

In addition, during FY 2003 and 2004, NSF established and refined the Award Monitoring and Business Assistance Program that provides the strategic framework for assessing and managing awardee risks. Cost sharing is identified as a high-risk factor and is a focus of the risk assessment protocol. The increased use of on-site review provides important business and managerial assistance to awardees in this area.

NSF cost sharing requirements beyond the statutory requirement (1%) are clearly stated in relevant program solicitations. The most recent award data reveal a significant reduction in awards with required cost sharing (non-statutory):

Fiscal Year	C/S Dollars	Awards	Total Award Actions	%
FY 2000	$508 M	3109	19,789	15.71
FY 2001	$534 M	3346	20,529	16.30
FY 2002	$419 M	3188	21,369	14.92
FY 2003	$325 M	2359	22,782	10.35
FY 2004	$244 M	1556	22,862	6.80

On October 14, 2004, the NSB revised the Board policy on cost sharing, to eliminate program specific cost sharing and require only statutory cost sharing (1%). NSF will develop a plan to implement the revised policy, including continued monitoring of the remaining ongoing awards that have specific cost sharing requirements.

MANAGEMENT CHALLENGE	AGENCY ACTIONS

Information (IT) 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.

[OIG Memorandum October 17, 2003: Management Challenges for NSF in FY 2004]

The NSF Information Technology Security (ITS) Program remains focused on ensuring that NSF infrastructure and critical assets are appropriately protected while maintaining an open and collaborative environment for science and engineering research and education. NSF has strengthened all areas of its information security program in FY 2004, and has invested significant time and resources to certify and accredit general support systems and major applications.

To address Foundation concerns regarding agency computer systems that might be vulnerable to attack, in FY 2003 NSF embarked on an ambitious endeavor to identify and certify and accredit the major applications and general support systems critical to the agency's mission. NSF ultimately identified nineteen systems (two general support systems and seventeen major applications) requiring certification and accreditation, as required by OMB Circular A-130. Eighteen of those systems had the requisite certification and accreditation as of September 30, 2003. In FY 2004, NSF began the triennial cycle of recertification.

Documentation in accordance with OMB Circular A-130, "Management of Federal Information Resources" of risk assessments and commensurate security plans for major systems is prepared and independently reviewed. NSF has a comprehensive disaster recovery program and continuity of operations plan. In FY 2004, NSF conducted two Disaster Recovery exercises. In addition, NSF participated in the May 11-13 Forward Challenge 2004 (FC 04) government-wide continuity of operations exercise developed by the Department of Homeland Security (DHS).

Antarctic Security: The United States Antarctic Program (USAP) made significant progress in 2004 toward resolving vulnerabilities. The program developed and issued program-wide security policies, completed an inventory of their IT systems, and developed a comprehensive Plan of Action and Milestones (POA&M) that the program is actively working on. The USAP general support system has been certified and accredited. The major applications are on track to be certified and accredited by the end of this calendar year.

NSF has addressed development of security policies in 2004 by developing and publishing policies for Networks Connections, Passwords, Secure Storage and Transmission of System and Application Passwords, Wireless Data Networking, Peer-to-Peer File Sharing, and Personal Use for NSF's Technology and Communication Resources. The agency's Information Security Handbook was also updated.

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

The use of external expert panels to review results and outcomes is a common, long-standing practice used by the academic research and education community. NSF's use of such panels (e.g., Committees of Visitors) predates GPRA and was specifically cited as an example of a good quality assessment tool by GAO* as well as in a memorandum on research and development investment

MANAGEMENT CHALLENGE	AGENCY ACTIONS
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. [OIG Memorandum October 17, 2003: Management Challenges for NSF in FY 2004]	criteria issued jointly by OMB and the Office of Science and Technology Policy (OSTP) on June 5, 2003, to all federal agency heads. Nevertheless, NSF continues to strengthen and improve the COV process. Specifically, as a result of a September 2003 OIG audit of the COV process, NSF has made the necessary changes as recommended by the OIG and has completely resolved the issues identified. NSF has engaged an external party to provide an independent verification and validation (V&V) of selected GPRA goals for FY 2000-2002, and all GPRA goals starting in FY 2003. The independent V&V and the Advisory Committee for GPRA Performance Assessment (AC/GPA), including experts in statistics and performance assessment, concluded in their reports that the approach to nugget collection – a type of non-probabilistic sampling, commonly referred to as "judgmental" or "purposeful" sampling – is best designed to identify notable examples and outcomes resulting from NSF's investments, and is appropriate for the purposes of evaluating NSF's outcome goals. The FY 2003 Performance and Accountability Report (PAR) provided additional details to ensure that readers understand the reasons for these conclusions, and the FY 2004 PAR includes similar statements. The AC/GPA had access to over 50,000 project reports and three years of COV reports in addition to nuggets. While it is correct that some COV reports do not address all strategic outcome goals, the volume of information covering the NSF portfolio vastly overshadows these minor gaps. The work of COVs is well known to the Committee membership as most currently and formerly served as COV members. *An Evaluation Culture and Collaborative Partnerships Help Build Agency Capacity (GAO-03-454)

Budget, Cost and Performance Integration

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.	In FY 2004, NSF developed a work plan to integrate budget, cost and performance that has been approved by OMB and enables NSF to achieve success in the President's Management Agenda initiative to integrate budget and performance. The Budget, Cost and Performance Integration (BCPI) work plan outlines a process in which strategic planning drives budgetary decisions, tracks accountability for performance and identifies full cost. NSF adopted a new strategic plan in the fall of 2003 that established a new programmatic framework that aligns the

MANAGEMENT CHALLENGE	AGENCY ACTIONS
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. [OIG Memorandum October 17, 2003: Management Challenges for NSF in FY 2004]	agency's four long-term strategic outcome goals with investment categories for which resources can be discretely identified and tracked, from operating plans to obligations to expenditures. Full budgetary costs for each investment category are identified, as administrative and management overhead (indirect costs) is distributed to strategic goals and investment categories. NSF's FY 2004 Statement of Net Cost was updated to reflect NSF's new programmatic framework and identifies the full cost of NSF's primary programs. Cost accounting is a key aspect of the BCPI work plan. NSF developed a financial crosswalk that aligns costs collected in the appropriations structure with the program investment categories. Work is currently underway to interface the crosswalk with the Financial Accounting System (FAS); when completed NSF will have the capability to identify the full cost of all investments, including both direct and indirect costs, automatically. Currently, NSF senior management meets quarterly to review financial and performance information, including cost data since it has become available.

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.	NSF agrees with the OIG that the safety of scientists and workers, environmental concerns, and the national interests of the U.S. Government require unique management and administrative skills that are responsive to the special needs of Antarctic scientific research. In order to meet these challenges, NSF staff utilize their special expertise to coordinate support of scientists in Antarctica, to oversee construction and maintenance of all infrastructure, and to oversee environmental, health, safety and medical activities. NSF's response to the 2003 OIG audit of the occupational health and safety, and medical programs noted that the Office of Polar Programs (OPP) has extensive plans for upgrading and updating its Antarctic facilities and infrastructure, including the McMurdo Long Range Development Plan, which was subsequently provided to the OIG. The subsequent semiannual OIG report commented that this plan "reflects a robust methodology for identifying and prioritizing facilities requirements, and properly recognizes projects with safety and environmental concerns as being the highest priority." A similar plan led to funding for modernization of our facilities at South Pole Station, a comprehensive project scheduled for completion in 2007. NSF includes in its budget requests the priorities for each year. The report suggests that plans be updated regularly, and in fact planning and prioritizing is done in preparation for the annual Congressional budget request. We will continue to work to acquire the funding to meet the needs of the Program in an effective manner. On the issue of recommendations on infrastructure made by committees in 1997 and 2001, OPP fully agrees that facilities

MANAGEMENT CHALLENGE	AGENCY ACTIONS
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. [OIG Memorandum October 17, 2003: Management Challenges for NSF in FY 2004]	maintenance deserves high priority. Success within the budget process comes through coupling maintenance and relatively small facility upgrade requirements closely to the future needs – both specific and general – of the Program. For major infrastructure projects, support is available through the agency's Major Research Equipment and Facilities Construction account, as in the case of the South Pole environment and safety upgrade, as well as South Pole Station Modernization and LC-130 conversions. OPP has been able to sustain an ongoing effort to maintain and upgrade facilities at McMurdo and Palmer Stations, albeit at a slower pace than is ideal. Even at that pace, however, the following projects are representative of those undertaken since the committee reports referenced in the OIG Memorandum: • South Pole Telemedicine Capabilities • McMurdo Wastewater Treatment Plant • McMurdo Fire Water Suppression • McMurdo – Dining Facility and Dormitories Upgrades • McMurdo Hazardous Waste Yard • Energy Conservation Upgrades • Replacement Fuel Storage and Secondary Containment • Palmer Lab and General Purpose Buildings Upgrades • Palmer Garage Warehouse Upgrade • Palmer Earth Station Upgrade NSF is fully committed to providing infrastructure that provides a safe and healthy environment, and we believe we have done so.

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. [OIG Memorandum October 17, 2003: Management	NSF considers its merit review process the keystone for award selection. The agency evaluates proposals using two criteria – the intellectual merit of the proposed activity and its broader impacts. NSF staff rely on expert evaluation by selected peers when evaluating proposals and making funding decisions. Each year, approximately 250,000 merit reviews are provided to assist NSF with the evaluation of proposals. In FY 2003, the number of proposals received from minority PIs increased by 12 percent. The funding rate for minority PIs was 27 percent, the same as the overall funding rate for NSF. During FY 2003, the number of proposals received from women PIs increased by 9 percent, and the funding rate was 28 percent. Obtaining data about the gender and ethnicity of individual reviewers remains a challenge due to the fact that provision of such data is voluntary. For example, in FY 2003, out of a total of 40,020 distinct reviewers who returned reviews, 5,336 provided demographic information. Out of the 5,336 who provided information, 1,818 (34 %) indicated they were members of an underrepresented group. In FY 2004 NSF altered the FastLane reviewer module to make it more convenient for reviewers to provide demographic information. A preliminary examination has shown a slight increase in the proportion of reviewers providing information after the FastLane change. NSF will continue to monitor the situation over time, and take additional measures as needed in order to obtain the data necessary to evaluate increased participation. In FY 2003 and FY 2004 NSF continued to use seminars and

MANAGEMENT CHALLENGE	AGENCY ACTIONS
Challenges for NSF in FY 2004]	proposal writing workshops for broadening participation purposes, focusing on underrepresented minorities, minority serving institutions (Tribal Colleges, Historically Black Colleges and Universities, and Hispanic Serving Institutions), and regions of the country that normally do not receive major research support from the federal government.
	In FY 2004 NSF hired Dr. Thomas Windham as Senior Advisor for Science and Engineering Workforce. Dr. Windham will be addressing efforts to broaden participation, including the vertical and horizontal integration of programs within the Foundation to provide synergy and sharing of effective approaches. In addition, NSF is preparing an internal science and engineering diversity plan.

The Math and Science Partnership Program

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.	NSF has developed a comprehensive plan for the oversight and management of all Math and Science Partnership (MSP) awards. Larger, more complex awards have been made as cooperative agreements. These cooperative agreements describe the post-award management and oversight needed to support the Partnerships in realizing their goals. In making decisions for continued funding, the MSP program draws upon NSF's strong, community-based site visit processes. With few exceptions, the lead partners responsible for both fiscal and project management of Partnerships are institutions with significant experience and a track record of responsibility in handling federal funds.
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.

[OIG Memorandum October 17, 2003: Management Challenges for NSF in FY 2004] | In FY 2004 – consistent with the focus of the solicitation on the middle and high school grade levels – no large, new Comprehensive Partnerships that address the entire K-12 continuum are being funded. The Targeted Partnerships being recommended for award from the FY 2004 solicitation have been subjected to an increased and more intensive level of review than in previous years, and this review has included an early analysis of the prospective awardee's experience/ability to properly administer federal funds. In FY 2004, all Partnership awards are being made to institutions of higher education, thus increasing the likelihood of the awardee's ability to receive and spend federal dollars responsibly.

Early in FY 2004 NSF hosted a financial and management oversight meeting for all funded Partnerships in order to enhance their fiscal management capacity, and to enhance awardees' understanding of their responsibilities in such critical areas as subaward monitoring, proper documentation of time and effort, participant support, etc. **All** MSP awardees – each Principal Investigator and a representative from his/her institutional business/accounting office – participated in this fiscal management workshop at NSF.

In summer 2004, critical site visits were completed for Cohort I Comprehensive Partnerships to inform NSF decisions about continued funding. In addition, any questions or concerns about a grantee's financial management identified through review of annual progress reports (which include financial reports), through site visits, or by other means are pursued further, in consultation with NSF's Division of Grants and Agreements (DGA) and/or staff in Cost Accounting and Audit Resolution, Division of |

MANAGEMENT CHALLENGE	AGENCY ACTIONS
	Institution and Award Support (DIAS).
	<u>Ongoing Management and Oversight</u>. MSP employs a six-pronged approach to project management and oversight: (1) site and reverse site visits to awardees; (2) Program Officer review of annual progress reports and project-specific formative evaluations; (3) use of co-operative agreements for all Comprehensive Partnerships and – starting in FY 2003 – all Targeted Partnerships, and other mechanisms, such as carefully formulated "conditions of award" in grants, that enable focused oversight; (4) technical assistance, especially for new awardees; (5) an information management system for data collection and monitoring of awards; and (6) a substantial overall program evaluation. An award for a comprehensive, overall external evaluation of the MSP program is being made in FY 2004, consonant with the research and development nature of the program.
	Because the MSP program extends beyond traditional domains and calls for innovative practices that go beyond the commonplace, its intellectual foundations and progression of work define it as an R&D effort. R&D efforts are necessarily administered and evaluated in ways that differ from implementation efforts, where the nature of the work is predetermined and where the tools and best practices needed for effective evaluation and administration are known in advance. The six-pronged approach discussed above utilizes all available resources that are known to have potential for informing and shaping such R&D work as NSF's MSP program.