CHALLENGE: Establishing Accountability over Large Cooperative Agreements

Overview: For the past four years we have directed significant attention to proposed construction budgets for NSF's recent high-risk, high-dollar cooperative agreements for large construction projects. We found that NSF approved proposed budgets for four major projects, totaling more than $1.4 billion although significant questions existed as to the adequacy of the proposed budgets. As a result, while NSF knows what it will spend on these projects, it is not clear whether it knows what they should cost.

After four years of audit effort, the OIG escalated the recommendation for NSF to require current cost estimates for its large projects, in addition to our other recommendations-- to remove unallowable contingency from budget; require annual incurred cost submissions and audits; track contingency expenditures; and strengthen cost surveillance over large cooperative agreements. Escalation of recommendations is the final step available to the OIG in an attempt to urge NSF to strengthen accountability and to exercise proper stewardship of federal funds. NSF did not agree completely with any of the recommendations, but has stated that it will revise certain policies to address some of them.

Challenge for the Agency: It is an ongoing challenge for NSF to establish accountability for the billions of federal funds in its large cooperative agreements at the pre- and post-award stages and throughout the lifecycle of the projects.

Accountability begins at the pre-award stage and should include audits of awardees' proposed budgets and accounting systems to ensure that awardees' cost estimates are fair and reasonable and that the accounting system is adequate to bill the government properly. The Large Synoptic Survey Telescope (LSST) project was the first construction project NSF considered since our 2012 alert memo on the agency's management of its high-risk, high-dollar cooperative agreements.

We found that NSF's internal review of the cost of the LSST project could not independently verify costs for any of the 136 proposed expenditures sampled, including approximately $145 million in direct materials, nearly $20 million for contingencies and more than $6 million in direct labor costs. Nonetheless, NSF moved forward with this project although it has limited insight into the makeup of the project's cost and little if any, assurance that they are reasonable.

NSF also moved forward with the $433.8 million National Ecological Observatory Network (NEON) project. NEON project risks originated with the construction budget, which included $154 million (nearly 36 percent of the total proposed budget) in questioned and unsupported costs, as identified by OIG audits. Auditors issued three inadequacy memos over a four month period in 2011 and issued an adverse opinion on the proposed budget in 2012 because the proposal did not form an acceptable basis for negotiation of a fair and reasonable price. As the project has progressed, additional serious financial management problems have surfaced. For example:

- An August 2015 independent, external assessment commissioned by NSF of NEON's cost estimate to complete the project gave the estimate an overall rating of "inadequate."
- In 2013, during the indirect cost rate negotiation of fiscal year 2011, NSF found potential questionable spending by NEON for meals, visa, and entertainment activities, among other things. In the same year, the indirect cost rate negotiation of fiscal year 2012 disclosed the potential of lobbying activities.
- The NEON construction award requires NSF approval before using contingency funds; however, NEON has been executing against a revised project plan that incorporated $35 million of budget contingency into the performance measurement baseline without prior NSF approval. To date, NSF has not determined whether NEON actually spent any of the $35 million in contingency. If, as OIG recommended, NSF held contingency funds until NEON provided sufficient support for their use, the NSF would have greater visibility over contingency expenditures and assurance that the funds were not spent in advance of NSF approval.

In June 2015, NEON management notified NSF that the project was facing a potential cost overrun of $80 million. It is noteworthy, that NSF was originally informed by NEON that the cost overrun would be $27 million. In response to questions from NSF, NEON increased that estimate to $40 million, then to $60 million and finally to $80 million.

In light of the concerns about the NEON cost proposal, NSF should have increased its oversight of costs as the project progressed. Instead, once the project was underway NSF did not require adequate evidence that project expenditures were warranted, reasonable, or allowable under NSF and federal requirements.

NSF did not start requiring NEON to provide more detail about its spending until May 2015, and NSF has just recently started reviewing transaction level detail associated with expenditures that appeared unusual. Obtaining and reviewing transaction level data throughout the life of the project could have revealed unallowable or unreasonable expenditures, or funds spent for awards other than those for which they were provided. Incurred cost submissions and visibility over expenditures, including contingency spending, as OIG has recommended, are critical.

If NSF had strong cost surveillance practices in place from the start of the NEON project, it would have had the information it needed to identify the potential cost overruns early on, and would have been able to address them before they amounted to tens of millions of dollars. We will continue to urge the Foundation to exercise the highest level of attention and scrutiny to the financial management of its large facility projects.

OIG's Assessment of the Agency's Progress: In response to our recommendations on LSST, NSF stated that it would review the project's risk management process, including a detailed contingency review. NSF stated that it agreed with the "spirit" of our recommendations on NEON and that it is conducting monthly expenditure reviews and increasing its involvement in

management of the NEON project. NSF also stated that it plans to contract for an independent assessment of the December 2015 cost estimate to complete the project.

With respect to its large cooperative agreements, NSF has said that it will require annual incurred cost information that can be used to conduct an audit and that it will conduct incurred cost audits for projects valued at $100 million or more at project completion and possibly at other points during the project, based on its own assessment of risk. Finally, NSF has contracted for an external, independent evaluation of its policies and procedures for large facility projects. That evaluation is expected to be available in December 2015.

As described above, NSF has stated that it intends to take some actions to strengthen accountability over its large cooperative agreements. However, in most instances, these proposed actions are forward looking, and we have not been able to verify whether they have been implemented and are working. Therefore, we remain concerned about NSF's progress toward improving cost surveillance for its largest cooperative agreements.

CHALLENGE: Management of NSF's Business Operations

Overview: NSF is a small agency in terms of staff, but one with a significant appropriation and an important portfolio of responsibilities. Its mission is to promote the progress of science primarily by making productive investments in research and the nation's science infrastructure. Consequently, most of NSF's managers and staff are successful science or engineering professionals highly qualified to help determine the composition of the agency's investments.

Selecting and producing great science is the agency's most important job, but with an annual appropriation of over $7 billion and a diverse portfolio of projects to manage, NSF leadership cannot overlook the importance of its administrative operations. Effective executives and administrators are as critical to NSF's success as are its scientists. The "business" side of NSF faces a set of challenges aimed at improving the organizations' management controls over payments, information security, recordkeeping, and reporting. Simply stated, NSF will be challenged to "multitask" and deliver both scientific and organizational excellence.

Challenge for the Agency:

Finding and Eliminating Improper Payments

Ensuring that payments are proper at the time they're initiated has always been challenging for NSF because grant recipients are generally not required to present supporting documentation, such as invoices and receipts, in order to receive payments from the agency. As a result, NSF issues approximately $6 billion annually in grant and cooperative agreement payments without verification, relying almost completely on the *recipients'* systems of internal control to ensure that only proper payments are requested and that any improper payments are self-identified and corrected by the recipient.

In June 2015, we issued a report on NSF's non-compliance with the Improper Payment Elimination Act (IPERA) requirements for FY 2014. The report identified significant issues

with how NSF executed the risk assessment used by the agency to conclude it was not susceptible to significant improper payments. Specifically, in its risk assessment NSF did not address all of the required risk factors, reached unsupportable conclusions for some of the transactions tested, and lacked alignment of the risk indicators with the ultimate conclusion of low risk. In addition, in the quantitative portion of the risk assessment NSF did not consider payments corrected after the fact by recipients to be improper payments, nor did it maintain the stated statistical validity in the execution of its sampling plan. As this was the second consecutive report that found significant issues with NSF's risk assessment, we recommended that the agency conduct a statistically valid sample in order to determine an estimated improper payment rate that would establish once and for all whether or not NSF is susceptible to significant improper payments. While NSF generally agreed with some of the report's findings, it did not believe that it was non-compliant with IPERA.

The *Standards for Internal Control in the Federal Government,* issued by the Government Accountability Office in September 2014 (the "Green Book") states that, "Internal control is a process effected by an entity's oversight body, management, and other personnel…" It further states that, "…management designs control activities so that all transactions are completely and accurately recorded." NSF's challenges in this area are to develop an internal control process that provides reasonable assurance that payments are proper at the time they are made, and to develop a sound process for assessing its risk of improper payments.

Protecting Agency information and IT Resources

The protection of its information systems against unauthorized access or modification is critical to NSF's ability to carry out its mission. As demonstrated by the recent data breach at the Office of Personnel Management, extreme diligence is required to deal with today's increasingly sophisticated threat landscape. In addition to certain recurring IT security weaknesses, NSF has some long-standing issues that warrant increased attention, particularly with regard to its Antarctic Program. NSF management should allocate appropriate resources to correcting these weaknesses and providing increased assurance that the systems and information are adequately protected.

In addition, continuous monitoring of IT systems is essential to the timely identification and mitigation of IT security risks. OMB requires agencies to develop and maintain an information security continuous monitoring (ISCM) strategy and implement an ISCM program in accordance with specific NIST guidelines. Per OMB's guidance, agencies must implement continuous monitoring of security controls as part of a phased approach through Fiscal Year (FY) 2017. NSF's approach to strengthen continuous monitoring includes implementing the DHS Continuous Diagnostic and Mitigation Program and transitioning to ongoing authorization. In this environment of an ever increasing number and sophistication of IT security threats, it is imperative that NSF continue to dedicate the appropriate attention and resources to implementing a robust ISCM program.

Promoting Accountability and Transparency

The Digital Accountability and Transparency Act (DATA Act) directs the federal government to standardize and publish a wide variety of reports and data in order to foster greater transparency over federal spending. Federal agencies must implement the DATA Act by May 2017. The implementation is being led by a joint team from the U.S. Department of the Treasury and the Office of Management and Budget (the DATA Act Project Management Office or PMO). The iterative nature of the Data Act PMO's implementation strategy and evolving federal guidance make it difficult for agencies, including NSF, to integrate the implementation effort into existing IT governance and resource requirements planning structures. Also, there are critical issues that still need to be resolved on a government-wide basis, as well as guidance in key areas that is needed before agencies can fully develop their own project plans.

Other factors also present a significant challenge for NSF in successfully implementing the requirements of the Act including: the potential for necessary modifications to the agency System for Award Management (SAM) interfaces; the lack of available agency FTEs to ensure that adequate staff are dedicated to DATA Act implementation; and the potential that NSF's relocation in 2017 may impact the allocation of additional funding (should it be needed) beyond what is currently planned. Also, the lack of a clear source of funding to make the necessary system and process changes to support implementation presents a risk to the success of the DATA Act implementation. As the guidance on DATA Act requirements is rolled out, cost estimates and implementation plans are likely to change, making it difficult for the agency to adequately prepare.

Managing the Government's Records

In 2011, President Obama signed a memorandum initiating a government-wide effort to reform federal recordkeeping in light of the dramatic increase in the amount of electronic information that the government manages. The Office of Management and Budget (OMB) and the National Archives and Records Administration (NARA) issued a follow-up directive in 2012, which required federal agencies to take specific actions by appointed dates to reform the policies and practices for the management of records, and provide a framework for the management of electronic records.

The U.S. Government Accountability Office (GAO) issued an audit report in May 2015 on the implementation of the directive at 24 departments and agencies, including NSF. GAO found that NSF did not submit a Senior Agency Official report, and did not provide information to NARA on how it intended to manage permanent electronic records, or a date when it would submit this information. Nor did NSF provide a date when its required review for temporary and permanent email records would be completed. Further, GAO found that NSF did not report to NARA that it did not possess any permanent records that were 30 years old or older, as the directive required. Finally, GAO found that as late as March 2015, NSF could not provide a date when it will complete the identification of any portion of its unscheduled records, increasing the risk that it might destroy such records without NARA approving or being aware. GAO made four recommendations to NSF to address the agency-specific findings in the report. NSF should provide a prompt response to GAO's recommendations, and comply with NARA's directive.

OIG's Assessment of the Agency's Progress: NSF needs to devote more attention to its business operations in order to surmount the challenges presented by these four issue areas. While NSF has taken steps to improve its reporting on improper payments in the agency financial records, it confuses the differences between improper payments and unallowable costs. For example, a cost may ultimately be allowable while also being considered an improper payment at the time it was made. And a payment may be considered improper, even if the recipient later identifies and self-corrects the error. Without a better understanding of how an improper payment is defined, NSF will continue to have difficulties assessing whether it is susceptible to improper payments.

NSF also continues to take action to correct IT security issues, although progress in resolving the issues in its Antarctic Program (USAP) have been delayed during the past several years by the changeover to a new Antarctic contractor, as well as the impending expiration of the lease on the USAP's facility in Centennial, CO. During FY 2015 USAP finally replaced a very out-of-date software application used to process personnel, medical, equipment maintenance, and procurement transactions. However, since FY 2006 we have reported that USAP needs to improve its disaster recovery and continuity of operations planning for its Denver data center. The timeline for remediation of this issue is contingent upon the availability of funding. Regarding NSF's continuous monitoring program, DHS recently awarded a contract that will allow NSF to initiate contacts with the contractor and to form a Continuous Diagnostic and Mitigation working group.

With regard to the Data Act, in FY 2015 NSF organized its DATA Act implementation team, and established a governance structure, including a Senior Accountable Official (SAO), an Executive-level Steering Committee, and a NSF DATA Act Working Group (DAWG). NSF also assigned staff to the on-going government-wide working group effort to review, define, and standardize DATA Act data elements; actively participated in other DATA Act-related government-wide activities; and identified agency staff with subject matter expertise for consultation. Finally, NSF issued its initial Data Act Implementation Plan in August, along with its related cost estimate.

Regarding the GAO report on recordkeeping, NSF stated that it is currently preparing a response.

CHALLENGE: Management of the IPA Program

Overview: In addition to its permanent scientific staff, NSF utilizes a rotating staff of external researchers and educators from across the United States to participate in the funding decision process. Those external researchers, called "rotators", constitute roughly 30% of NSF's program officers and also serve in executive positions such as Assistant Directors who lead one of NSF's seven science directorates. Most come to NSF under the authority of the Intergovernmental Personnel Act (IPA) for a period of up to four years, and then return to their home institutions.

Rotating staff are an important component of NSF's workforce and bring valuable experience to the Foundation. In many instances, however, rotators cost more than federal employees performing the same job, and they are frequently away from the office as they continue research

at their home institutions. While we recognize the significant contributions made by rotators, it is essential for NSF to examine the costs associated with the rotator programs – funds spent directly on the rotators and costs associated with the rotator program--to ensure that federal funds entrusted to the Foundation are being spent effectively and efficiently.

Challenge for the Agency: Recent audits and investigations have identified weaknesses in NSF's management of the IPA program, a program that serves as a cornerstone of its scientific and management hiring programs. NSF is challenged to establish and maintain strong oversight of this program to ensure continuity of effective leadership within the Foundation while maintaining high ethical standards and compliance with laws and regulations despite the high personnel turnover rate the program produces.

The challenges associated with NSF's reliance on rotators include: frequent turnover of personnel, management of inherent conflict of interests (COI) that arise from having individuals whose institutions receive NSF funding come to the agency to assist in funding decisions, the establishment and maintenance of transparency in funding decisions, and ensuring that rotators comply with federal laws after they leave NSF. Finally, the additional cost of using IPAs instead of hiring permanent employees is significant; our 2013 audit found that NSF paid an annual additional cost of approximately $6.7 million or an average of over $36,000 per IPA for the 184 IPAs we examined.

Managing Conflicts of Interest

In light of the Foundation's reliance on rotators to make funding decisions, it is critical that strong controls are in place to identify and mitigate conflicts of interests (COIs) that occur as a result of rotators' research activities and their connections with their home institutions. Such controls protect rotators—many of whom have never worked in a federal environment—as well as the Foundation itself.

A recent investigative report documented problems with controls over COIs we identified in the context of one rotator's tenure at NSF. We found that:

- No concrete plan to manage the rotator's known conflicts was developed and communicated;
- There were significant delays in the rotator's completion of a required ethics course and her submission of a required financial disclosure form;
- Actions taken to assess the impact of the rotator's COIs on an award she made were seriously flawed;
- The names of the persons who wrote the justification for funding and who actually made the decision to fund the award with which the rotator had conflicts were not included in NSF's system of record, undermining the agency's ability to identify and mitigate COIs; and
- A critical tool used to enforce the one-year cooling off period following the rotator's tenure at NSF was circumvented.

We have recommended that NSF take various actions to strengthen its controls over COIs.

Impact of Frequent Turnover in Management Positions

As noted, IPAs generally serve in executive positions, such as Assistant Directors who lead NSF's science directorates. NSF expects its executives to provide strategic direction, make investment and funding decisions, oversee and monitor grant-making processes, as well as supervise and manage scientific and administrative staff. Currently, six out of seven of NSF's Scientific Directorates are headed by IPAs.

Continual turnover, especially in leadership positions, presents challenges for NSF. Succession planning and knowledge transfer become constant and thus, more critical functions, as NSF is continually recruiting and assessing new leaders. Once they are found and hired, NSF is challenged to ensure these leaders receive training to understand the culture of the Federal government, and how that impacts the day-to-day management of NSF. New leaders must be trained in NSF's government and management processes and systems, and conflicts of interest must be identified and recognized and managed, as current and prior activities of these executives may influence funding decisions and oversight responsibilities. The constant reshuffling of senior management also leads to lack of continuity for programmatic leadership for research initiatives.

Transparency in Funding Decisions

The turnover in program managers, who make significant contributions to funding decisions, also creates a transparency challenge. In one directorate, we identified a concern about transparency regarding grant funding decisions between outgoing and incoming IPAs. Specifically some IPA program officers believed it to be acceptable to carry out a predecessor's decision to fund a proposal. In one instance, after an outgoing IPA negotiated a budget and agreed to fund a proposal, his replacement IPA was expected to complete the funding action without exercising independent analysis of the matter. NSF did not have any record of the first IPA's deliberations on the matter.

Compliance with Federal Laws after IPA Assignment Ends

It is a challenge for NSF to ensure that IPA personnel fully understand their responsibility to comply with federal laws and regulations. We found an instance in one directorate in which an IPA interacted with NSF program officers during the one-year "cooling off" after departure from NSF. An NSF database, used to monitor conflicts by departed IPAs and enforce the cooling off period, was circumvented so that grants officers could not determine that the IPA should not be negotiating a new grant.

Cost of IPAs

Finally, NSF pays IPAs the salary and fringe benefits they were earning at their home institutions in addition to reimbursing them for travel to NSF, temporary living expenses, lost consulting income and state income taxes if the IPA in some instances. With respect to salaries, we found that for one year NSF paid an additional $3 million for IPA salaries, and, that, in August 2012,

54 IPAs' salaries exceeded the federal executive pay limit of $179,700. NSF paid 34 of these IPAs an annual salary of $200,000 or more; the highest annual IPA salary was over $300,000.

We calculated that NSF paid nearly $800,000 in additional fringe benefit costs for IPAs and paid more than $337,000 for lost consultations. We recommended that NSF evaluate ways to reduce IPA costs such as increasing telework form IPAs' home institutions and increasing cost sharing. While NSF has developed a plan to examine higher costs for IPAs, it has not yet implemented concrete actions.

OIG's Assessment of the Agency's Progress: NSF informed us that it communicates COI standards to rotators before they arrive and that it reinforces this information to each rotator in an email message after the rotator starts at NSF. With respect to transparency in funding decisions, NSF stated that it will review program management training to incorporate "best practices" related to funding decisions including that an outgoing program officer cannot bind an incoming program officer to recommend an initial award. In addition, NSF implemented a process to orient and train IPAs who are unfamiliar with federal government processes and practices.

In response to our audit of IPA costs, NSF stated that it would initiate actions that would balance potential costs reductions with possible effects on either recruitment efforts or the effectiveness of IPA working arrangements. NSF also informed us that in order to identify an appropriate set of actions, it undertook an assessment of mechanisms to reduce the cost of IPAs.

With respect to our findings related to controls over rotators' COIs, we remain concerned that additional attention is needed in this area and are currently assessing ways for us to evaluate the extent to which the problems we identified in one division are occurring across the Foundation.

With respect to the added costs of IPAs, in August 2014 NSF identified several actions it could take to reduce the added costs of IPAs. Unfortunately, as of the end of this reporting period, little progress had been made in accomplishing those actions.

CHALLENGE: Moving NSF Headquarters to a New Building

Overview: NSF was scheduled to occupy its new building in December 2016, and to be out of its existing buildings by February 2017. However, due to delays from an impasse in negotiations between NSF and its Union on workstation sizes and allocation of shared and support space, GSA negotiated the rental start date to September 1, 2017 at a delay cost of approximately $14.5 million.

Challenge for the Agency: If NSF causes additional schedule delays, it may need to extend these leases, which would require it to continue paying rent at two locations, with the rent for the current buildings likely being higher than it currently is. The revised relocation schedule includes little slack time and two phases of negotiations still need to be completed. The risk of further delay is considerable in light of the number of items that have to be negotiated with the union and the tight deadlines for resolving differences.

NSF faces four major risks to moving to its new headquarters before leases at its current buildings expire December 31, 2017. First, NSF lacks a detailed master schedule for its move. Second, NSF will have to negotiate with its union on several furniture-related and space issues, and has little time to do so. Third, the current schedule includes fewer opportunities for design review and a shorter time to complete these reviews. Finally, NSF faces risks because its new building has less storage space and the agency lacks an approved record schedule allowing destruction of underlying hard copy documents. These risks are exacerbated by constant leadership turnovers and the lack of a single person responsible for the project who has direct access to the Director. We have issued two alert memos to the NSF Director raising concerns about continued schedule delays and the risk of the associated higher costs.

OIG's Assessment of the Agency's Progress: With assistance and input from GSA, NSF's schedule for the move was revised, which reduced the original delay by approximately six months. NSF successfully met two deadlines for reviewing interior design. NSF has informed us that a contractor will present workstation layout design options to both NSF and Union together. It is NSF's view that presenting options in this manner may help NSF and the Union reach agreement on this issue.

NSF continues to face significant challenges with respect to union negotiations for items which must be decided within a short time. Therefore, we continue to encourage NSF senior management to focus the highest level of attention on its move to its new headquarters.

CHALLENGE: Management of the U.S. Antarctic Program

Overview: Antarctica is the coldest, driest, windiest, most remote continent on earth. The weather changes frequently and abruptly; temperature drops of as much as 65 degrees Farenheit in twelve minutes have been recorded.

NSF, through the United States Antarctic Program (USAP), manages U.S. scientific research in Antarctica. The program's goals are: to understand the Antarctica and its associated ecosystems; to understand the region's effects on, and responses to global processes such as climate; and to use Antarctica's unique features for scientific research that cannot be done as well elsewhere. The Antarctic Support Contract, which was awarded to Lockheed Martin in December 2011 is NSF's largest contract, valued at nearly $2 billion over 13 years.

Challenge for the Agency: Establishing and maintaining a world-class scientific research program in Antarctica's remote and harsh environment is a formidable logistical challenge. The July 2012 report by the Blue Ribbon Panel, commissioned by NSF and the Office of Science and Technology Policy, focused on eight major areas including capital budgeting, communications, and health and safety, which presented the most significant challenges.

NSF developed a matrix to track its progress in implementing recommendations from the Blue Ribbon Panel report. In June 2013, we issued a memorandum to NSF making several suggestions to improve the usefulness of this matrix, such as including timelines for action and identifying a responsible person for each action. Our 2013 audit of the medical screening process for travelers to Antarctica found that NSF's medical review panel has made

recommendations that could reduce the cost of this process, but NSF has not implemented many of these recommendations.

Another challenge for NSF is to control the cost of the USAP and to ensure adequate oversight of payments to the USAP contractor. For example, for the last five years the medical review panel recommended that NSF base required medical tests on factors such as how long an individual will be in Antarctica, and what their duty station and job responsibilities will be. Revising the number of medical tests performed to reflect these criteria could lower costs of the screening process, which currently totals approximately $860 per person.

Our July 2015 audit of the health and safety of USAP participants identified four areas for improvement in: 1) developing a process to identify, respond to, track, and collect data on all misconduct incidents that occur in USAP; 2) improving pharmacy operations; 3) ensuring Special Deputies in the Antarctic have adequate tools and training to perform their law enforcement responsibilities; and 4) enforcing and potentially expanding the requirement for breathalyzer tests.

OIG's Assessment of the Agency's Progress: NSF has been tracking progress against the Blue Ribbon Panel recommendations in its working matrix and has improved that document in response to our recommendations. In response to our audit on reducing costs of the medical screening process, NSF concurred with the OIG's recommendations and has formalized its process for addressing and tracking medical panel recommendations.

NSF generally agreed with the recommendations in our 2015 health and safety audit and informed us that it plans to take several steps to implement the recommendations such as sharing information on violations of the Code of Conduct and issuing a reminder to the contractor regarding management of drug interactions and making patients aware of drug safety information.

In addition, NSF informed us that it authorized the contractor to obtain breathalyzers that do not require calibration and that the contractor recently updated the manuals for the medical clinics, including procedures related to controls over medication. Finally, NSF plans to host a law enforcement site visit to Antarctica.

Finally, NSF has informed us that it does not plan to develop a process to identify and track misconduct by all USAP participants, including researchers. As a result, NSF lacks information needed to prevent or limit future misconduct, which increases the risk that future problems may go unaddressed and possibly become more severe. The lack of such information about all USAP participants may also undermine the agency's ability to ensure that similar infractions are handled consistently, whether they are committed by a researcher or a contractor employee.

CHALLENGE: Improving Grant Administration

Overview: Making grants in support of promising scientific research is NSF's primary business and a key element of its mission. In FY 2014, NSF acted on more than 48,000 proposals for research, education and training projects, and funded close to 11,000 new awards. As of

September 30, 2015, NSF had a portfolio of over 48,000 active awards totaling approximately $32.5 billion. Since most of these awards are grants, it is vital that NSF's grant-related business processes ensure that grantees spend their funds appropriately.

Challenge for the Agency: Ensuring that grant funds are spent as intended has always been challenging because grant recipients are not required to present supporting documentation, such as invoices and receipts, in order to receive payment from the agency. In addition, while recent efforts to reduce the administrative impact on grantees are commendable, accountability for public funds should not be compromised in the process. Therefore, the challenge for NSF is to implement controls over the spending of grant funds that ensure transparency and accountability, but do not create undue administrative impacts on awardees and federal program officers.

One step NSF and other federal agencies have taken to reduce the burden on researchers is to streamline the written guidance for administering grants. However, we are concerned that in an effort to reduce the guidance, some clarifying text has been eliminated that may lead to inconsistent interpretations and directions being given to awardees. With scores of program officers fielding questions from numerous awardees on a daily basis, NSF will be challenged to provide consistent guidance that does not contradict previous responses or its written policies.

On December 26, 2013, OMB issued its final rule, 2 CFR Part 200, "Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards" (Uniform Grant Guidance or UGG). The UGG streamlined eight OMB administrative, cost, and audit circulars into one circular that covers all types of non-federal entities that receive federal awards. NSF revised its *Proposal & Award Policies & Procedures Guide* to implement the UGG. Changes included in the revised Guide became effective December 26, 2014. As NSF makes new awards and renews existing ones under the revised Guide, it should monitor implementation of the new policies to ensure that no unintended consequences arise as a result. Also, as noted in last year's Management Challenge, OMB raised the single audit threshold from $500,000 to $750,000, effectively removing audit coverage on millions of dollars in NSF funding. NSF will need to take additional steps to oversee the awardees who fall below the threshold.

In addition, OMB changed requirements related to documentation of labor effort, making it more challenging to assess the allowability of salaries and related costs on an ongoing basis. Under the UGG, colleges and universities are permitted to charge awards for salary costs based on budget estimates rather than on the actual work performed, provided only that "significant changes" are entered "in a timely manner" and that the final amount charged to the federal award is accurate, allowable, and properly allocated. NSF faces the challenge of implementing OMB guidance over awardee spending for research salaries—generally the largest item of expense in research awards—that only requires awardees to ensure salary costs are reasonable at the end of an award.

As OMB is changing its documentation requirements for research salaries, ongoing initiatives to reduce administrative requirements on sponsored researchers present additional challenges to NSF. Among these is an effort to change the manner in which salaries are certified as allowable charges to federal grants. OIG recently issued reports on implementation of pilot payroll

certification systems at two NSF awardee institutions.[1] Our audits highlighted the challenges NSF faces in providing effective stewardship over taxpayer money without placing unnecessary administrative burdens on researchers. The reports noted that any system's ability to properly account for federal research funds relies on the controls built into the system. They reminded NSF to reinforce with its awardees the need to design and implement controls that reduce the risk of improper charges to federal awards and provide a means to ensure the controls are achieving that objective.

Finally, OMB significantly shortened the audit resolution timeframe. Prior to the UGG, federal agencies had 6 months to issue management decision letters on findings affecting the agency from the time they received an audit report. The new OMB requirement allows 6 months from the date that *the report is submitted to the Federal Audit Clearinghouse*. For NSF, this change would effectively shorten the audit resolution timeframe by 30 days, unless the agency can establish a new accelerated process for identifying and tracking reports that require resolution.

OIG's Assessment of the Agency's Progress: NSF took several actions this past year to strengthen grant administration but more are needed. As previously noted, the agency's revised *Proposal & Award Policies & Procedures Guide*, implementing the UGG, became effective in December 2014. OIG and NSF continue to discuss transferring responsibility for identifying single audit findings that require NSF resolution to NSF. Finally, NSF continues to use its Award Monitoring and Business Assistance Program (AMBAP) which includes baseline and advanced monitoring activities. During advanced monitoring, NSF assesses the internal controls of its awardees to ensure adequate administration of the NSF awards. During FY 2015, NSF planned and completed 30 Advanced Monitoring Site Visit reviews and 147 desk reviews.

Challenge: Encouraging the Ethical Conduct of Research

Overview: Congress passed the America COMPETES Act in 2007 to increase innovation through research and development, and to improve the competitiveness of the United States in the world economy. NSF responded to the Act by mandating mentoring plans for all postdoctoral positions and directing that grantees provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduate and graduate students, and postdoctoral researchers participating in the proposed research project.

However, information collected during investigations, site visits, and reviews of institutional Responsible Conduct of Research (RCR) plans suggests that some institutions consider RCR as just another compliance requirement, rather than part of its educational mission. Furthermore, some research suggests that many of the ethics training programs currently available do little to change the perspectives of students and postdocs regarding the ethical conduct of research. As more stories about research misconduct circulate in the media, the public's confidence in the research enterprise is weakened and taxpayer support of science is undermined. NSF is therefore challenged to provide more oversight on institutional implementation of these requirements and to provide meaningful guidance regarding RCR training.

[1] Reports on pilot implementation at George Mason University (OIG 15-1-017, issued July 31, 2015) and Michigan Technological University (OIG 15-1-023, issued September 30, 2015).

Challenge for the agency: NSF's primary challenge is to ensure that awardees implement effective RCR programs. At a time when opinion surveys indicate more Americans are becoming distrustful of science, it is important that the conduct of scientific research not be tainted by instances of misrepresentation or cheating. Recent surveys also suggest that cheating is endemic at various levels of education, with 30% of researchers admitting to engaging in questionable research practices or knowing someone who has engaged in such practices.

Consistent with these survey results, OIG has seen a dramatic increase in substantive allegations of plagiarism and data fabrication since 2004, especially as it relates to junior faculty members and graduate students. The number of allegations investigated has grown from a low of 45 in 2004 to 75 this past year. Even more important, however, has been the rise in serious instances of research misconduct as evidenced by the number of research misconduct findings by NSF. In 2004, two research misconduct findings were made, while in 2014 there were 20 research misconduct findings.

In addition, OIG has seen a substantial increase of allegations related to peer-review based confidentiality violations, false representations in CVs, false representations of publications in annual/final reports, failure to list all affiliations and current support (especially at overseas institutions), and fraudulent or otherwise improper use of grant funds. The number and variety of ethical issues identified in our investigative activities suggest that institutions have not sufficiently emphasized research integrity as a core value – not only at the student level but at the faculty level as well.

The NSF Act places responsibility on NSF to strengthen scientific and engineering research potential at all levels in various fields. NSF's research and training programs reach individuals who are ultimately employed by academia, industry, and government. These individuals could have a broad and positive impact on the US science, engineering, and education workforce. NSF has been responsive to recommended actions contained in our individual research misconduct investigation reports. However, such agency actions only address incidents after the fact. Extrapolation of the number of allegations OIG has received across the 40,000 proposals NSF receives annually, suggests that approximately 1200 proposals could contain plagiarism and up to 800 proposals or NSF-supported research results (e.g., papers and annual/final reports) could contain falsified or fabricated data. Since NSF funds research in virtually every non-medical research discipline, and its funding reaches the educational range of kindergarten through post-Ph.D., the agency is in a unique position to lead the government response to these disturbing trends and have an impact across all levels of education.

OIG's Assessment of the Agency's Progress: The agency responded to the America COMPETES Act by creating a requirement that grantees submit mentoring plans for all NSF-supported postdoctoral positions and by requiring that grantees provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduate students, graduate students, and postdoctoral researchers participating in the proposed NSF-funded research project. However, in contrast to the RCR requirements adopted by NIH in 2010, those implemented by NSF do not have specific course requirements, nor do they provide guidance about the content, structure, or format of the courses.

Other actions the agency has taken include the development of a new ethics research program called Cultivating Cultures for Ethical Science Technology Engineering Mathematics (CCE STEM). The CCE STEM research effort is focused on identifying the factors that create climates that foster and encourage research integrity rather than focusing on curriculum development on integrity issues. The Agency also worked with the National Academies to develop and make available ethics materials that will be applicable across all scientific fields that NSF supports.

OIG has developed a plan to systematically review RCR plans that were initiated as a result of the NSF's implementation of the America COMPETES Act. We have requested RCR plans from 50 random grantee institutions, and have so far reviewed about one half of the plans. To date, OIG has observed a broad disparity among grantee responses to the RCR requirement, which range from high-quality mentoring programs, to programs that simply refer students to web-based training, to schools that are unaware of the RCR requirement. Early educational intervention remains critical to any effort to ensure that students understand proper professional practices and the implications of failing to follow them.

OIG continues to receive substantive data fabrication/falsification allegations involving students, post-docs, and faculty. We currently have 38 active investigations regarding such allegations, an increase of 58% over the previous year. Therefore, we believe that more needs to be done to address this problem, and NSF should exert its influence with institutions regarding this important issue.