



National Science Foundation • Office of Inspector General
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October 23, 2014

MEMORANDUM

To: Dr. Dan E. Arvizu
Chair, National Science Board

Dr. France Córdoba
Director, National Science Foundation

From: Allison Lerner *Allison C. Lerner*
Inspector General, National Science Foundation

Subject: Management Challenges for NSF in FY 2015

In accordance with the Reports Consolidation Act of 2000, I am submitting our annual statement summarizing what the Office of Inspector General 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 and investigative work, general knowledge of the agency's operations and evaluative reports of others, including the Government Accountability Office and NSF's various advisory committees, contractors, and staff.

We have focused on six issue areas that reflect fundamental program risk and are likely to require management's attention for years to come. They are:

- Establishing Accountability over Large Cooperative Agreements
- Improving Grant Administration
- Managing the U.S. Antarctic Program
- Moving NSF Headquarters to a New Building
- Managing Programs and Resources in Times of Budget Austerity
- Encouraging Ethical Conduct of Research

For the past four years, we have focused significant attention on NSF's accountability over its high-dollar, high-risk cooperative agreements for construction of large facility projects. In that time, four major projects totaling more than \$1.4 billion were funded. Our work raised serious questions about whether NSF had sufficient information to ensure that the budgets represented the basis for a fair and reasonable price. In light of that work, we have repeatedly recommended that NSF obtain proposal and accounting system audits for high-risk cooperative agreements to ensure that costs estimates are fair and reasonable and that proposers' accounting systems are adequate to bill the government properly.

Since our emphasis has been on cooperative agreements and since contract administration was not cited as a significant deficiency in NSF's FY 2013 financial statement audit, we did not include contract administration as a top management challenge this year. In addition, NSF reported that it has taken several steps to strengthen contract administration including ensuring Cost Accounting Standards Disclosure Statements are determined adequate for covered contracts and providing additional guidance in its acquisition manual. We will continue to monitor NSF's progress toward implementing improvements in contract administration. Also, in FY 2015, the OIG will conduct two contract audits related to polar services as well as an audit of the final payment voucher for Raytheon's Antarctic support contract.

Finally, since 90 percent of ARRA awards are now closed, we have removed stewardship of ARRA funds as a top management challenge. However, our FY 2015 workplan includes audits of 16 institutions that received ARRA funds. Among our things, these audits will determine whether institutions are properly accounting for ARRA funds as required and whether ARRA quarterly reports are accurate.

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

CHALLENGE: Establishing Accountability over Large Cooperative Agreements

Overview: As of August 2013, NSF had 23 cooperative agreements worth over \$50 million each and totaling over \$4.2 billion. Over the last four years, audits of the proposed construction budgets for three of these non-competitive proposals valued at \$1.1 billion found that they contained approximately \$305 million (almost 28 percent), in unallowable or unsupported costs.

It is essential that NSF exercise strong cost surveillance controls throughout the lifecycle of its high-risk, high-dollar large facility projects. At the pre-award stage, proposed costs by awardees should be supported by current, accurate, and complete documentation and awardees' accounting systems must be capable of properly managing federal funds. After an award has been made, NSF and the OIG should have access to information needed for adequate oversight of these projects.

After four years of audit effort, NSF's proposed actions in this area remain short of the standard necessary to adequately safeguard federal funds and leave millions of dollars at risk. Therefore, in May 2014 the OIG escalated a series of recommendations made to address these concerns to Deputy Director, who is NSF's Audit Follow-up Official. 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.

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.

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. Among other things, that memo recommended that NSF obtain proposal and accounting systems audits to ensure that cost estimates for such projects were fair and reasonable and that proposers' accounting systems were adequate to bill the government properly.

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.

In September 2014, we issued an alert memo expressing our strong concern that NSF did not have sufficient information to establish a reasonable basis for the cost of the LSST project. As a result, NSF has limited insight into the makeup of the project's cost and little if any, assurance that they are reasonable.

In addition, NSF is conducting the LSST project under a cooperative agreement with the Association of Universities for Research in Astronomy (AURA). For four years, audits have repeatedly documented significant estimating deficiencies with AURA and concluded that AURA does not have an effective process for preparing adequate proposals. In light of the

known and continuing deficiencies with AURA's estimating practices and cost proposals and the lingering uncertainties about the reasonableness, accuracy, and currency of many of the costs proposed for the LSST project, NSF should take immediate and strong action to ensure that costs proposed for and incurred under the project comply with federal and NSF requirements.

In addition to the problems with the LSST proposal, an effort to audit the cost proposal for construction of the Daniel K. Inouye Solar Telescope (DKIST formerly ATST) resulted in a disclaimer of opinion due to significant deficiencies in the proposal, including unsupported estimates, outdated vendor quotes, and the inclusion of amounts for an unallowable contingency reserve. The auditors stated, "In summary, AURA did not support the material cost in their proposal using adequate cost or pricing data, they did not use actual costs in the rebaseline of the proposal when actual costs do exist, and they included costs that were explicitly unallowable per the OMB circular regulations."

For four years, similar deficiencies have been documented in audits of AURA (the entity submitting the proposal to build the DKIST). This report confirms that AURA has not corrected these deficiencies or improved its proposal estimating practices. Because the proposed costs could not be affirmed as an acceptable basis for a fair and reasonable price, NSF can have no assurance that the proposal is an acceptable basis for funding. Further, the inadequacy of this cost estimate directly impacts the recipient's ability to properly monitor and manage federal funds. The repeated estimating deficiencies demonstrate lack of improvement on the part of both AURA and NSF to exercise proper stewardship over the millions of dollars awarded for this project and heighten our concerns about unsupported costs being proposed and included in high-dollar, high-risk awards.

We have been urging NSF for the past four years to strengthen accountability of its high-dollar, high-risk cooperative agreements for its large facility construction projects. NSF applies its highest level of attention and scrutiny to determine the scientific merit of the projects it decides to fund. It is imperative that NSF apply the same rigorous attention and scrutiny to its financial management of these projects, prior to requesting NSF approval for award. The stakes are too high for the Foundation to continue its current practice of requesting NSF approval and making awards before it ensures that project costs are reasonable, are supported by adequate documentation, and will use taxpayer dollars efficiently.

OIG's Assessment of the Agency's Progress: NSF stated that it has published guidance on cost analysis of construction cost estimates and has drafted guidance on the use and management of contingency in large facility cooperative agreements. NSF also reported that it continues to review the risk management process for large facilities and that in FY 2014 it conducted four business system reviews of large facility awardees.

CHALLENGE: Improving Grant Administration

Overview: NSF's mission of "promoting the progress of science" is accomplished largely through the making of grants in support of promising scientific research. In FY 2013, NSF competitively reviewed approximately 49,000 proposals for research, education and training projects, and funded close to 11,000 new awards. As of September 30, 2014, NSF had a portfolio

of over 41,000 active awards totaling approximately \$36.6 billion. Since most of these awards are grants, it is vital that NSF's grant management 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 worthwhile, care must be taken to ensure that accountability for public funds is not compromised in the process. Therefore, the challenge for NSF is implementing controls over the spending of grant funds that ensure transparency and accountability, while not creating undue administrative impacts on awardees and federal program officers.

One step federal agencies have taken to reduce such impacts on researchers is to streamline the written guidance for administering grants. While a reduction in extraneous guidance is welcome, we are concerned that some useful guidance has also been eliminated and will increase the risk that inconsistent interpretations and direction will be given to awardees. With scores of program officers overseeing thousands of awards and fielding questions from numerous awardees on a daily basis, NSF will be challenged to provide consistent messages across the spectrum of awardees and ensure its replies do not contradict each other or its written policies. OIG has observed several recent situations in which awardees individually have requested NSF's interpretation and direction on a particular issue, but the direction provided conflicted with NSF's published policy and/or prior informal guidance received from NSF personnel.

Recent changes to government-wide grants policy also presents challenges for NSF. 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. However, as part of this initiative OMB raised the single audit threshold from \$500,000 to \$750,000. Using data for single audits of entity fiscal year 2012 (the most recent year with complete data), NSF will lose single audit visibility for approximately \$11.8 million in NSF funds provided directly to awardees, and will need to take additional steps to oversee the awardees who expend these funds.

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 basis of 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.

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 recently issued a draft of the December 2014 “Proposal and Award Policies and Procedures Guide” (PAPPG), which, in conjunction with NSF’s “Grant General Conditions” (GC-1), will serve as the agency’s implementation of the UGG. Also, OIG and NSF have entered into discussions about possibly transferring responsibility for identifying single audit findings that require NSF resolution to NSF in FY 2015. Finally, NSF continues to use its Award Monitoring and Business Assistance Program (AMBAP) to provide advanced internal control monitoring of awardee institutions. During FY 2014, NSF planned and completed 30 AMBAP reviews.

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 F 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 USAP supports research in virtually every area of science funded not only through NSF, but also through other federal agencies such as the U.S. Geological Survey, the National Oceanic and Atmospheric Administration, and the National Aeronautics and Space Administration. 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, found that U.S. activities in Antarctica were well-managed, but suffered from an aging infrastructure, lack of a capital budget, and the effects of operating in an extremely unforgiving environment. To address these pressing challenges, the Panel made recommendations pertaining to ten topic areas and provided 84 implementing actions to support these overarching recommendations.

In March 2013, NSF responded to the recommendations with a summary report and a working matrix describing the status of the 84 implementing actions. In June 2013, we issued a memorandum to NSF making several suggestions to improve the usefulness of its working matrix, such as including timelines for action and identifying a responsible person for each action. NSF has been tracking progress in its working matrix and has improved that document.

In May 2014 we began an audit to assess the effectiveness of NSF's oversight and the contractor's performance to ensure the overall health and safety of USAP participants. The audit will include an assessment of health and safety programs and related policy, procedures and training, the adequacy of incident reporting, and NSF's progress toward implementing Blue Ribbon Panel recommendations related to health and safety. It is noteworthy, however, that more than three years after the Panel's report, NSF has not provided a public, point-by-point response to the Panel's recommendations.

Another challenge for NSF is to control the cost of the USAP and to ensure adequate oversight of payments to the USAP contractor. 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. For example, for the last five years the 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.

Finally, cost containment issues are also a challenge for NSF. The Antarctic Support Contract, which was awarded to Lockheed Martin in December 2011 is the agency's largest contract, valued at approximately \$1.925 billion over 13 years, and is a cost reimbursement contract. Such contracts are inherently risky because the government assumes much of the risk that poor performance on the part of the contractor will result in cost overruns. In addition, the contract includes a provision for the contractor to receive an award fee based on an assessment of its performance. An NSF official in the Division of Polar Programs makes the final decision about whether the contractor receives an award fee and then also determines the amount of the award fee based on a panel recommendation. Absent input from an external, independent entity, it may be a challenge for NSF to objectively evaluate the contractor's performance.

OIG's Assessment of the Agency's Progress: NSF's has improved its internal tracking matrix for the 84 implementing actions, by adding target dates and identifying a responsible person for each action, among other things.

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.

CHALLENGE: Moving NSF Headquarters to a New Building

Overview: In June 2013, the U.S. General Services Administration (GSA) announced that it signed a 15 year lease agreement on behalf of NSF for a new headquarters building to be constructed in Alexandria, VA. The new building will be approximately the same size as NSF's current location. NSF is scheduled to occupy the new building by December 30, 2016, and begin paying rent on it on January 1, 2017. Any delays in the occupancy date caused by NSF could have a significant cost to NSF.

Challenge for the Agency: The OIG issued an Alert Memo in September 2014, which expressed strong concern about missed schedule milestone dates that have occurred already and which could continue as a result of an ongoing impasse between NSF and its union. NSF received the Union's written opposition to certain issues in September 2013, but these issues have not been resolved despite multiple mediation sessions and other attempts to address concerns.

The Union filed a Request for Assistance with the Federal Labor Relations Authority's Federal Service Impasses Panel (FSIP) in June 2014. Depending on the FSIP's decision, (which is binding) NSF could incur additional schedule delays. If delays like this continue and cannot be mitigated, they could result in significant charges to the agency because NSF may have to pay certain costs (which have yet to be negotiated) for every day it causes the occupancy date to be delayed. Due to the significant risks of continued impasse, it is imperative that NSF senior management focus the highest level of attention on this issue.

Continued missed milestone dates are likely to impact other schedule milestones, such as the interior construction and occupancy date. While NSF has told us that it may be able to make up lost time it is difficult to know how much continued schedule slippage can be mitigated.

Another challenge is planning the logistics of the actual move. NSF stated that computers, chairs, and tables will be moved to the new building and that its primary cost will be for workstation furniture that cannot be moved. NSF will need to procure new workstation furniture in a timely manner and tightly control moving expenses for the items it moves from Arlington. NSF is considering different options and there may be a period of time when it is operating in both buildings, which could be a challenge for holding merit review panels, which are essential to NSF's mission of awarding grants for scientific research.

OIG's Assessment of the Agency's Progress: NSF has been planning for a possible move since 2008, when it hired a project director. NSF created the Future NSF Headquarters Office (FNSF) to coordinate and manage the move. The FNSF's project director assisted with NSF's last move in 1993 from Washington DC to Arlington. NSF reported that it has held more than 80 staff design review meetings to ensure the timely response to design submittals, in accordance with the lease requirement. In addition, NSF informed us that it plans to negotiate a construction delivery schedule that minimizes the financial risk to NSF.

CHALLENGE: Managing Programs and Resources in Times of Budget Austerity

Overview: Given the limitations placed on future Federal budgets by the Budget Control Act of 2011, NSF's efforts to maintain and possibly increase its funding will be subject to great scrutiny. Lean budget times like these require management to pay even closer attention to how money is spent in order to ensure that the agency's expenditures are cost-effective, investments in programs provide a strong return on the taxpayer's dollars, and that those investments align directly with national priorities.

There are numerous discretionary purchases that occur on a weekly or monthly basis within an organization as large as NSF that offer real opportunities for savings. For example, OIG completed an audit of purchase cards and found that NSF's controls over the purchase card program needed to be strengthened to prevent and detect inappropriate purchases. Prompted by suspicious purchases identified by its auditors, OIG conducted an investigation which led to the cardholder pleading guilty to stealing more than \$94,000 from NSF. In response to the audit's recommendations, NSF issued a revised purchase card policy, implemented improved training for cardholders, and improved its review and monitoring of purchase card transactions.

OIG's audit of the United States Antarctic Program's Medical Screening Process determined that NSF should consider opportunities that exist for cost savings on medical screenings. OIG found that nearly 20 percent of applicants withdraw each year before completing the medical screening process, representing a significant amount of time and effort for staff as well as incurring medical examination costs. This OIG audit also found that NSF needs to improve oversight of Antarctic support contract medical processing payments, due to a risk that applicants may submit claims for expenses that are not eligible for reimbursement, and that the contractor may submit inaccurate invoices for medical costs to NSF. The OIG will continue to perform reviews or audits to identify possible cost savings of NSF operations and programs..

Challenge for the Agency: There are many opportunities to conserve money within a \$7 billion organization like NSF without compromising the accomplishment of the agency's core mission. The agency is therefore challenged to identify opportunities to streamline administrative processes and cut costs where it can to send a clear message to its employees and stakeholders that strong, sound management controls are being applied; reasonable ideas to reduce spending are welcome and will be implemented; and that NSF is a responsible steward of the public's funds.

OIG's Assessment of the Agency's Progress: NSF continues to make progress in identifying ways to reduce administrative costs during FYs 2013 and 2014. To instill an agency-wide culture of cost-saving, NSF encouraged staff to submit ideas for cost savings. NSF management concurred with OIG's audit recommendations to improve controls over purchase cards and consider opportunities for cost saving for United States Antarctic Program's Medical Screening Process. The agency has also introduced or continues to implement specific cost cutting initiatives for travel, conferences, printing, mobile devices, and telecommunications. NSF has been reducing travel costs by further increasing the use of virtual merit review panels and encouraging the use of non-refundable tickets for staff travel.

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 students, graduate students, and postdoctoral researchers participating in the proposed research project.

However, information collected during investigations, from site visits, and from reviews of institutional RCR plans suggests that some institutions are not taking these requirements seriously. Furthermore, the findings of research funded by NSF's Ethics Education in Science and Engineering Program suggests that many of the ethics training programs currently available provide limited positive effect on the perspectives of students and postdocs regarding the ethical conduct of research. This potentially compromises the public's confidence in the research enterprise and affects the safety of NSF funds. NSF is challenged to provide more oversight on institutional implementation of these requirements and to provide meaningful guidance regarding RCR training.

Challenge for the agency: NSF's primary challenge is to ensure that awardees implement effective RCR programs. RCR is just one component necessary to create a culture of academic integrity that extends to all levels of the university. At a time when opinion surveys indicate that 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. Affirmative steps are necessary to counter the trends of increasing integrity-related violations. Recent surveys suggest that cheating is endemic at various levels of education, with 30% of researchers admitting to engaging in questionable research practices. Consistent with these survey results, OIG has seen a dramatic increase in substantive allegations of plagiarism and data fabrication, especially as it relates to junior faculty members and graduate students. Over the past 10 years, the number of allegations received by our office has more than doubled, as have the number of findings of research misconduct NSF has made based on OIG investigation reports. 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 strongly suggest that the general ethical fabric of the research enterprise may be at risk – not only at the student level but at the faculty level as well.

Only 10% of the science and engineering workforce hold PhD's. For this reason, 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 45,000 proposals NSF receives annually, suggests that 1300 proposals could contain plagiarism and 450-900 proposals could contain falsified data. Since NSF funds research in virtually every non-medical research discipline, the agency is in a unique position to lead the government response to these disturbing trends at 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 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 research project.

The NSF guidance is very limited compared with those instituted at NIH in 2010. OIG has observed a wide disparity among grantee RCR programs, ranging from high quality mentoring programs to programs that simply refer students to web-based or computer-based training. Early intervention remains critical to any effort to ensure that students understand proper professional practices and the implications of misconduct. We continue to receive substantive data fabrication/falsification allegations involving students, post-docs, and faculty. We currently have 24 active investigations regarding such allegations. Therefore, we believe that more needs to be done and NSF should expand its influence with institutions regarding this important issue. OIG has developed a plan to systematically review RCR plans that were initiated as a result of the America COMPETES Act. We have requested RCR plan details from 50 random grantee institutions and hope to complete that review in the near future.

Other actions the agency has taken include the development of a new ethics research program called Cultivating Cultures for Ethical STEM (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 is also working with the National Academies to develop and make available ethics materials that will be applicable across all scientific fields that NSF supports.