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Before the

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Science, Space, and Technology

Subcommittee on Research and Technology

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Chairwoman Comstock, Ranking Member Lipinski, and Members of the Subcommittee, I appreciate this opportunity to discuss the Office of Inspector General's (OIG) work to promote the efficiency and effectiveness of the National Science Foundation's (NSF) programs and operations and to safeguard their integrity. My office is committed to providing rigorous, independent oversight of NSF, and I welcome the chance to discuss some of the challenges facing the Foundation, NSF's progress in addressing these challenges, and work that remains to further advance accountability and transparency at NSF.

Background

NSF is an independent federal agency and the funding source for approximately 24 percent of all federally supported basic research conducted by the nation's colleges and universities. In many areas, such as mathematics and computer science, NSF is the major source of federal backing. The Foundation funds approximately 12,000 new awards each year, thereby fulfilling its mission to promote the progress of science. Proposals for funding are assessed by panels of experts as part of NSF's merit review process.

Awards are made primarily as grants to individuals and small groups of investigators, as well as to research centers and facilities where scientists, engineers, and students undertake research projects. The Foundation also uses cooperative agreements and contracts to fund major research equipment such as telescopes, Antarctic research sites, and high-end computer facilities. In FY 2016, NSF was appropriated approximately \$7.5 billion to carry out the Foundation's programs and operations.

The OIG is independent from NSF and reports directly to Congress and the National Science Board (NSB). Our mission is to conduct independent and objective audits, inspections, reviews and investigations of National Science Foundation programs and operations, and to recommend policies and corrective actions to promote effectiveness and efficiency and prevent and detect

waste, fraud, and abuse. Consistent with our statutory mandate, the OIG has an oversight role and does not determine policy or engage in management activities involving the Foundation or program operations. Thus, my office is not responsible for managing any NSF programs, nor do we attempt to assess the scientific merit of research funded by the Foundation.

The OIG has two main components: the Office of Audits and the Office of Investigations. The Office of Audits is responsible for auditing NSF's internal operations, as well as the grants, contracts, and cooperative agreements funded by the Foundation. Among its ongoing responsibilities are the annual audits of NSF's financial statements and the annual reviews of NSF's information system security program.

Through our audit work, we are able to monitor management functions that may pose significant financial or programmatic risks to the Foundation. In determining priorities for this work, we consider the results of prior audits and consult with the Foundation's senior management, the National Science Board and Congress, the Office of Management and Budget, and members of the research community supported by the Foundation. In selecting areas for audit, we assess factors such as the risk involved in the activity, the potential for monetary recovery for the government, and the greatest substantive benefit for NSF.

The Office of Investigations (OI) is responsible for investigating allegations of wrongdoing involving NSF programs and operations, agency personnel, and organizations or individuals who submit proposals to, receive awards from, or conduct business with NSF. OI also houses a team of investigative scientists responsible for investigating allegations of fabrication, falsification or plagiarism in NSF-funded research.

We focus our investigative resources on the most serious cases, as measured by such factors as the amount of money involved, the seriousness of the alleged criminal, civil or ethical violations, and the strength of the evidence. When appropriate, the results of these investigations are referred to the Department of Justice for possible criminal prosecution or civil litigation, or to NSF for administrative resolution.

Ongoing Management Challenges

NSF leads the world as an innovative agency dedicated to advancing science. Its awards have led to many discoveries that have contributed to the country and the world's economic growth. Beyond its scientific mission, as a federal agency NSF must be a responsible steward of taxpayer dollars and spend scarce research funds properly. Inattention to its fiscal and administrative responsibilities can compromise NSF's ability to reach its fullest potential.

In this vein, each September the OIG identifies the top management challenges facing the Foundation. I have attached a summary of the top challenges set forth in our most recent Semiannual Report to Congress to this document; the complete version can be found at:https://www.nsf.gov/oig/pdf/FY17_Mgmt_Challenge.pdf

My testimony today will focus on three of NSF's continuing accountability challenges and the Foundation's progress toward addressing associated OIG recommendations. The challenges are:

- Establishing accountability over large cooperative agreements
- Management of the Intergovernmental Personnel Act (IPA) program, and
- Ensuring the ethical conduct of research

Effective responses to these challenges would help ensure the integrity of NSF-funded projects, and, in the case of the first two challenges, often also reduce their costs. I will discuss each of these three topics in greater detail below.

Establishing Accountability over Large Cooperative Agreements

While NSF fulfills its mission primarily through grants to researchers and institutions to advance promising science, the Foundation also uses cooperative agreements to construct and operate its large research facility projects. As of January 25, 2017, NSF had 459 active cooperative agreements totaling nearly \$8 billion. Twenty-two of these agreements are valued at over \$50 million each and add up cumulatively to more than \$4.4 billion.

Since 2010, my office has issued 28 reports containing more than 80 recommendations to improve NSF's use and management of cooperative agreements for the construction and operation of its high-dollar, high-risk research facilities. As a result of these reports, NSF has developed new policies and procedures to strengthen its monitoring of such facilities.

Among other things, NSF's new guidance requires completion of a Cost Proposal Review Document (CPRD) for each large facility proposal to ensure that a thorough and well-documented record exists of NSF's determination that proposed costs are reasonable. The CPRD is NSF's analysis of whether an awardee's proposed costs are supported adequately and describes NSF's plans for oversight of the award. NSF's new guidance also requires the Grants and Agreements Officer to determine that a project's estimated costs are reasonable *prior* to making a construction award for a facility.

These new policies and procedures represent important steps by NSF toward the goal of increased accountability over the Foundation's largest and riskiest projects. These actions led to the removal of a significant deficiency on NSF's inadequate monitoring of large cooperative agreements from the agency's FY 2016 financial statement audit. While this progress is significant, NSF's work in this area is ongoing.

My testimony will focus on four major categories of recommendations (ones related to the need for annual incurred cost submissions, the validation and certification of awardees' earned value management (EVM) systems and data, the creation of policies requiring end-to-end surveillance of large cooperative agreements, and the oversight of management fees paid to large facility awardees). These recommendations remain open and which are central to NSF's ability to enhance accountability over cooperative agreements for large facilities. My office and NSF management continue to work together to resolve these recommendations.

Incurred cost submissions

Incurred cost submissions, which include certified schedules of direct costs by award and applied indirect expenses, provide information that is critical for NSF to properly discharge its administrative and fiduciary responsibilities as a steward of Federal funds. They are also

essential tools for the conduct of an incurred cost audit. In some cases, the absence of properly prepared incurred cost submissions has added months, and even years, to the time required for audits conducted by my office.

To address this problem, we recommended that NSF require awardees with large facility cooperative agreements in excess of \$50 million to submit annual incurred cost submissions to ensure that costs are allowable, reasonable, and in compliance with Federal requirements.

In response to our recommendation, NSF has developed a tool to collect expenditure data from large facilities valued at \$100 million or more. This tool and revisions in NSF's Large Facilities Manual are awaiting OMB approval, which NSF expects to receive this month. In addition, the contractor NSF is using to conduct incurred cost audits is testing this tool with one of the Foundation's current large facility awardees.

The effectiveness of this tool depends on the quality of its implementation. When awardees start submitting expenditure data using this tool, we will evaluate both the information being provided and the actions NSF takes in response to that information.

Certification and Validation of Earned Value Management Systems

Proper oversight of a large facility project includes certifying the EVM system used to track the project's schedule and cost as well as validating the information the awardee provides in EVM reports.

Certification of an EVM system is needed to ensure that an awardee maintains an acceptable system, which includes data to support scheduling of work and interim progress reports, among other things. Our examination of thresholds other Federal agencies use when determining whether an awardee's EVM system should be certified found thresholds ranging from \$10 million and \$50 million.

Although the large facility awardees we have audited receive hundreds of millions of dollars in NSF funding, to date NSF has not required that their EVM systems be certified. In 2017, NSF verified (a process it indicated is similar to certification) the EVM system for the \$473 million Large Synoptic Telescope project and the \$344 Daniel K. Inouye Solar Telescope, projects which had been under construction for several years.

Validation of the data submitted by an awardee is an important tool for monitoring a project's spending and progress. If data is not validated, there is an increased risk that the information is inaccurate and does not correctly reflect the project's progress. For example, monthly EVM progress reports for the NEON project were not accurate, which undermined NSF's ability to promptly identify problems that ultimately led to NSF having to significantly de-scope the project to avoid an \$80 million cost overrun.

We recommended that NSF certify large facilities' EVM systems and validate the EVM data. NSF receives monthly reports from large facility awardees with earned value management information, which is used to measure project schedule and costs. If the EVM system is providing poor quality information, then an overrun may not be detected in a timely manner, as happened with the NEON project.

NSF has developed new guidance requiring verification of large facilities' EVM systems. It also developed new guidance related to the validation of large facilities' EVM systems and data, and

informed us that it has begun validating inputs into EVM systems. We are reviewing the new guidance to assess whether it is sufficiently robust to safeguard Federal funds and will provide feedback on that point to NSF.

End to End Cost Surveillance

Our audits and inspections of NSF's high-dollar large facility construction projects identified risks across the lifecycle of such projects. As a result, we recommended that NSF increase end-to-end cost surveillance for its largest and riskiest cooperative agreements valued at more than \$100 million. At the pre-award stage, such surveillance would include obtaining updated cost estimates and audits of awardees' proposed budgets and cost accounting systems/estimating practices. At the post-award stage, the monitoring would include requiring annual incurred cost submissions and incurred cost audits.

In response to this recommendation, NSF issued new policies, procedures and standard operating guidance covering topics from reviewing proposal budgets to incurred cost audits and agreed to have a third party evaluate the implementation of the new procedures. The estimated completion date for the third party evaluation is September 30, 2017.

Management Fees

Management fees have long been provided to Federally Funded Research and Development Centers (FFRDCs) based on a recognition that these centers -- which are typically non-profit entities almost wholly dependent on government funding -- might need to incur costs that cannot be reimbursed by the government. Under such circumstances, management fee was created to enable an FFRDC to be reimbursed for "ordinary and necessary" but otherwise unallowable business expenses that were essential to maintaining the FFRDC's financial viability. Such expenses might include working capital and interest payments.

Audits of NSF's negotiation, award, and management fee for two large facility projects found, among other things, that NSF did not obtain supporting documentation to determine the need for management fee and did not review actual expenditures that awardees paid using management fees to determine if expenditures were for ordinary and necessary business expenses.

We recommended that NFS require that awardees seeking management fee submit a written assertion of need detailing all their sources of revenue. NSF could use such information to help it determine whether the awardee has insufficient access to non-Federal funding to cover otherwise unallowable expenses necessary to maintain its financial viability and thus should receive management fee.

In addition to our recommendations on this topic, the December 2015 National Academy of Public Administration report which examined NSF's use and management of large cooperative agreements recommended that NSF end its use of management fees in cooperative agreements as a means of eliminating the additional management burdens associated with monitoring the award and because of the potential that inappropriate expenses will be funded by such fees.

NSF indicated it will be revising its management fee policies but has not committed to requiring awardees to report on other sources of revenue. It also indicated that it would like to calculate management fee using weighted guidelines similar to those found in contracts. We plan to review the revised policy to assess whether it is consistent with the historical bases for such fees.

OIG's Ongoing and Future Work related to the Management of Large Cooperative Agreements

While the Foundation has made real progress in its management of large cooperative agreements, we will continue to monitor this area because of the unique challenges it poses to the Foundation.

Based on the serious nature of this challenge and the progress that has been made to date, our objective moving forward is to examine how NSF is applying its new policies, procedures and guidance to strengthen accountability for both construction and operations awards from the pre-award stage through the lifecycle of the award. Successful implementation will require sustained management attention, effective communication with the awardee community, clear award terms and conditions, and most importantly, a continuing commitment to change culture at NSF.

We are currently auditing NSF's application of its new policies and procedures in one of its large facility research projects that is nearing the end of the construction phase. We expect to issue that report in the next few months.

Additionally, we are auditing NSF's oversight of a sample of sub-recipients including large facility sub-recipients, in response to a provision in the American Innovation and Competitiveness Act. Prior audit work disclosed that NSF could strengthen accountability over significant funding that is awarded to sub-recipients in large facility projects.

As we expand our work to examine NSF's oversight of the operation phase of large facilities, we recently started an audit to determine if NSF's internal controls are sufficient to ensure that the transfer of funds between construction and operation accounts follows applicable Federal requirements.

We will also pay close attention to the actions NSF takes in response to requirements in the American Innovation and Competitiveness Act. The Act contains a number of key oversight requirements related to NSF's large facility portfolio. For instance, it requires NSF to conduct a pre-award analysis of costs before making an award, obtain periodic external reviews on project management and performance, retain control over funds budgeted for contingency, and to establish guidelines regarding inappropriate expenditures associated with all fee types.

Management of the Intergovernmental Personnel Act Program

To further the agency's mission of supporting science and engineering research and education, NSF draws on scientists, engineers, and educators on rotational assignment from academia, industry or other eligible organizations. All of the non-permanent appointments are Federal employees with the exception of those who come to NSF under Intergovernmental Personnel Act (IPA) assignments. Individuals on IPA appointments remain employees of their home institutions. As a result, pay and benefits for IPAs are set by their home institutions and are not subject to limitations on Federal pay and benefits.

While there are benefits that come from having IPAs at NSF, there are also challenges. For example, because IPAs can serve in a temporary capacity only up to four years, there is

significant turnover in staff at NSF, especially in executive positions charged with leading the Foundation and setting its vision. As of December 2016, five of the seven Assistant Directors, whose primary responsibility is providing leadership and direction to the Foundation's scientific directorates, are IPAs (one Assistant Director slot is vacant). In addition, as of the same date, 20 out of NSF's 29 scientific divisions are led by IPAs (2 of those positions are vacant).

The Foundation's use of IPAs comes at a high cost and these costs are rising. In 2015, NSF paid nearly \$8.9 million¹ for 27 executive-level IPAs, compared to \$6.5 million for the same expenses for 21 executive-level IPAs in 2012. IPA salaries can also significantly exceed the salaries of the highest paid Federal employees. In 2015, the highest executive-level IPA salary was more than \$440,000, up 45 percent from \$301,247 in 2012. In 2015, the salaries for all but two executive level IPAs were more than the highest salary of a Federal employee at NSF. The number of IPAs has also increased--in 2009, there were 20 executive-level IPAs, whereas there were 29 executive-level IPAs in December 2016.

Finally, because most IPAs remain employees of their home institutions while at NSF and expect to return there after their tenure at the Foundation ends, most come to NSF with known conflicts of interests. In light of the Foundation's reliance on IPAs to make funding decisions, it is critical that strong controls be in place to identify and mitigate conflicts of interests that occur as a result of IPAs' own research activities or their connections with their home institutions. In June 2015 we issued a Management Implication Report (MIR), which disclosed a significant breakdown of numerous controls over an IPA's conflicts in one directorate.

Since 2010, we recommended that NSF evaluate ways to reduce IPA costs and have suggested, among other things, that the Foundation consider expanding the use of telework for IPAs and seeking greater cost sharing from IPAs' home institutions. Because IPA salaries and benefits are funded with program-related appropriations, savings in IPA costs would free up funds for additional research. We also made recommendations intended to enhance the Foundation's ability to manage IPA conflicts of interests.

In response to our recommendations related to the costs of IPAs, NSF no longer reimburses IPAs for lost consulting income; previously IPAs could receive up to \$10,000 from NSF each year for consulting income they received while at their institutions. NSF also formed a steering committee in April 2016 to explore opportunities to reduce IPA costs. To this end, NSF indicated that it will pilot a required 10 percent cost sharing of IPAs' academic-year salary and fringe benefits in FY 2017.

In its August 2015 response to our MIR, NSF management asserted that existing controls were sufficient to address potential rotators' COIs. On March 3, 2017, the NSF Director issued a memorandum stressing how important it is for all employees and rotators to uphold the highest ethical standards. The memorandum also urged employees to take seriously their obligations to attend ethics training and to file timely financial reports.

Moving forward, we will continue to monitor NSF's actions in response to our IPA-related recommendations. We will also examine NSF's actions in response to the American Innovation

¹ Includes salary, fringe benefits, lost consulting, and per diem.

and Competitiveness Act, which required the Foundation to report on its efforts to cut costs associated with employing IPAs.

Finally, in the next few weeks we expect to release a report assessing NSF's controls over rotators' COIs with an emphasis on the Foundation's progress in addressing recommendations from our June 2015 MIR.

Encouraging the Ethical Conduct of Research

Research misconduct—defined as plagiarism, data fabrication, or data falsification in proposed or funded research--damages the scientific enterprise, is a potential misuse of public funds, and undermines the trust of citizens in government-funded research. Falsification and fabrication in NSF-funded projects can literally cost lives, while plagiarism in such work is dishonest (and potentially actionable). It is therefore crucial to the integrity of research funded with taxpayer dollars that NSF-funded scientists adhere to the highest ethical standards as they carry out their projects. For these reasons, we continue to pursue allegations of research misconduct by NSF-funded researchers.

In recent years, we have seen a significant rise in the number of substantive allegations of research misconduct associated with NSF proposals and awards. Over the past four years, we have reported 175 research misconduct cases in our semiannual reports to Congress

Examples of significant cases include plagiarism by a full professor who claimed that he did not know that he should use quotation marks when he copied text into his NSF proposal; falsification by a graduate student who lied to university officials and pursued a legal challenge to an OIG subpoena; and data fabrication by a graduate student who improperly manipulated data.

NSF takes research misconduct seriously, as do NSF's awardee institutions. During our most recent semiannual reporting period, institutions took actions against individuals found to have committed research misconduct, ranging from letters of reprimand to termination of employment. Over the past four years, NSF's actions in response to our recommendations ranged from a letter of reprimand to a 5-year government-wide debarment.

NSF and OIG recently developed a new system to track the Foundation's response to our recommendations related to our research misconduct investigations. This system provides increased transparency and helps both NSF and OIG track the status of the recommendations.

We also perform outreach to universities and others in the research community to provide training and preventing, detecting, and investigating research misconduct. These efforts include briefings with university investigation and inquiry committees, research administrators, and graduate school officials, among others. In addition, our website contains links to all research misconduct case close-outs, which illustrate the fact patterns from our cases that can be used for training.

We will continue our investigative and outreach efforts in this area. In addition, in the next few weeks, we expect to issue a report detailing the results of our survey of institutions' efforts to implement Responsible Conduct of Research training required by the American COMPETES Act of 2007.

NSF/OIG Efforts to Strengthen Accountability: The Stewardship Collaborative

In conclusion, I would like to highlight the joint efforts NSF and OIG have made to improve the stewardship of Federal funds. OIG and NSF established the Stewardship Collaborative in 2010 to help achieve a shared mission – the proper stewardship of taxpayers’ investment in science, engineering, and education.

The Collaborative is comprised of staff from NSF’s financial administration division and OIG’s Office of Audits, and is chaired by Senior Executive leaders from both offices. It meets monthly to discuss current issues and identify possible upcoming barriers to resolution, as well as potential solutions. For example, it recently sponsored joint training to improve understanding of the audit resolution process, including participants’ individual responsibilities.

In addition to increasing positive communication between NSF and OIG, the Collaborative has been instrumental in ensuring that management decisions are made by the right people within NSF. It has thus helped resolve a number of critical audit recommendations more efficiently. Most importantly, the Collaborative has facilitated accountability over the use of Federal funds without compromising OIG’s independence, a fundamental tenet of the Inspector General Act.

Conclusion

Scientific research and discovery are the building blocks of the technological advances that are essential for our nation’s economy to grow and to meet the challenges of the future, and NSF has an essential role to play in promoting scientific discovery. For the agency to achieve its mission, NSF must spend its research funds in the most effective and efficient manner while maintaining the highest level of accountability over taxpayer dollars.

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 its programs and operations. My office will continue to utilize the full range of our audit and investigative resources to exercise robust oversight of NSF’s stewardship of Federal funds and to safeguard the integrity of the Foundation’s operations.

Public trust and confidence demand the highest level of accountability, and we look forward to working with NSF management, the National Science Board, and Congress to achieve this goal.

I would be happy to answer any questions.