Chapter 3

Appendices (Other Information)

SUMMARY OF FY 2020 FINANCIAL STATEMENT AUDIT AND MANAGEMENT ASSURANCES

Table 3.1 – Summary of Financial Statement Audit

Effectiveness of Internal Control over Financial Reporting (FMFIA § 2)					
Audit Opinion	*Unmodified*				
Restatement	*No*				
Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Ending Balance
Total Material Weaknesses	*0*	-	-	-	*0*

Table 3.2 – Summary of Management Assurances

Effectiveness of Internal Control over Financial Reporting (FMFIA § 2)						
Statement of Assurance	*Unmodified*					
Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
Total Material Weaknesses	*0*	-	-	-	-	*0*
Effectiveness of Internal Control over Operations (FMFIA § 2)						
Statement of Assurance	*Unmodified*					
Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
Total Material Weaknesses	*0*	-	-	-	-	*0*
Conformance with Federal Financial Management System Requirements (FMFIA § 4)						
Statement of Assurance	*Systems conform to financial management system requirements*					
Non-Conformances	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
Total non-conformances	*0*	-	-	-	-	*0*

Compliance with Section 803(a) of the Federal Financial Management Improvement Act (FFMIA)		
	Agency	Auditor
Federal Financial Management System Requirements	*No lack of compliance noted*	
Applicable Federal Accounting Standards	*No lack of compliance noted*	
USSGL at Transaction Level	*No lack of compliance noted*	

Management Challenges for the National Science Foundation in Fiscal Year 2021

October 15, 2020

AT A GLANCE

Management Challenges for the National Science Foundation in Fiscal Year 2021

October 15, 2020

WHY WE DID THIS REPORT

The *Reports Consolidation Act of 2000* (Pub. L. No. 106-531) requires us to annually update our assessment of NSF's "most serious management and performance challenges facing the agency … and the agency's progress in addressing those challenges."

WHAT WE FOUND

NSF leads the world as an innovative agency dedicated to advancing science. Its support of basic research has led to many discoveries that have contributed to the progress of science, as well as the national health, prosperity, and welfare. Beyond its scientific mission, NSF must be a responsible steward of taxpayer dollars.

This year, we have identified six areas representing challenges NSF must continue to address to enhance mission performance:

- Providing Oversight of Major Multi-User Research Facilities
- Providing Oversight of Grants During a Pandemic
- Managing the Intergovernmental Personnel Act Program
- Providing Oversight of the Antarctic Infrastructure Modernization for Science (AIMS) Project
- Increasing Diversity in Science & Engineering Education and Employment
- Mitigating Threats Posed by Foreign Government Talent Recruitment Programs

We have included information about challenges NSF faces in addressing the public health and economic crises resulting from the Coronavirus Disease 2019 (COVID-19) pandemic within each challenge section. We have also removed two challenges identified in our FY 2020 Management Challenges report — Meeting Digital Accountability and Transparency Act of 2014 (DATA Act) Reporting Requirements and Encouraging the Responsible and Ethical Conduct of Research — based on NSF's significant progress in these areas.

We are encouraged by NSF's progress in its efforts to address critical management and performance challenges. Effective responses to these challenges will continue to promote the integrity of NSF-funded projects, help ensure research funds are spent effectively and efficiently, and help maintain the highest level of accountability over taxpayer dollars.

AGENCY RESPONSE TO *MANAGEMENT CHALLENGES FOR FISCAL YEAR 2020*

Following the issuance of this report, NSF will include its Management Challenges Progress Report and its response to *Management Challenges for the National Science Foundation in Fiscal Year 2020* in its Agency Financial Report.

FOR FURTHER INFORMATION, CONTACT US AT OIGPUBLICAFFAIRS@NSF.GOV.

National Science Foundation • Office of Inspector General
2415 Eisenhower Avenue, Alexandria, Virginia 22314

MEMORANDUM

DATE: October 15, 2020

TO: Dr. Ellen Ochoa
Chair
National Science Board

Dr. Sethuraman Panchanathan
Director
National Science Foundation

FROM: Allison C. Lerner Allison C. Lerner
Inspector General
National Science Foundation

SUBJECT: Management Challenges for the National Science Foundation in Fiscal Year 2021

Attached for your information is our report, *Management Challenges for the National Science Foundation in Fiscal Year 2021*. The *Reports Consolidation Act of 2000* (Pub. L. No. 106-531) requires us to annually update our assessment of NSF's "most serious management and performance challenges facing the agency … and the agency's progress in addressing those challenges." A summary of the report will be included in the National Science Foundation Agency Financial Report.

If you have questions, please contact me at 703.292.7100.

Attachment

Table of Contents

Introduction 1

Challenge 1: Providing Oversight of Major Multi-User Research Facilities..... 3

Challenge 2: Providing Oversight of Grants During a Pandemic..... 4

Challenge 3: Managing the Intergovernmental Personnel Act Program..... 5

Challenge 4: Providing Oversight of the Antarctic Infrastructure Modernization for Science (AIMS) Project..... 6

Challenge 5: Increasing Diversity in Science & Engineering Education and Employment..... 7

Challenge 6: Mitigating Threats Posed by Foreign Government Talent Recruitment Programs..... 8

Appendix A: References..... 9

Additional Information.....10

Introduction

NSF leads the world as an innovative agency dedicated to advancing science. Its support of basic research has led to many discoveries that have contributed to the progress of science, as well as the national health, prosperity, and welfare. Beyond its scientific mission, NSF must be a responsible steward of taxpayer dollars.

The *Reports Consolidation Act of 2000* requires us to annually update our assessment of NSF's "most serious management and performance challenges facing the agency … and the agency's progress in addressing those challenges" (Pub. L. No. 106-531). Accordingly, we identify the challenges we consider most critical based on our audit and investigative work; general knowledge of the agency's operations; and evaluative reports of others, including the U.S. Government Accountability Office (GAO) and NSF's various advisory committees, contractors, and staff. We identify management challenges as those that meet at least one of the following criteria:

- The issue involves an operation that is critical to an NSF core mission.[1]
- There is a risk of fraud, waste, or abuse of NSF or other Government assets.
- The issue involves strategic alliances with other agencies, the Office of Management and Budget (OMB), the Administration, Congress, or the public.
- The issue is related to key initiatives of the President.
- The issue involves a legal or regulatory requirement not being met.

FY 2021 Challenges

This year, we have identified six areas representing the most serious management and performance challenges for NSF:

- Providing Oversight of Major Multi-User Research Facilities
- Providing Oversight of Grants During a Pandemic
- Managing the Intergovernmental Personnel Act Program
- Providing Oversight of the Antarctic Infrastructure Modernization for Science (AIMS) Project
- Increasing Diversity in Science & Engineering Education and Employment
- Mitigating Threats Posed by Foreign Government Talent Recruitment Programs

We describe our work and NSF's progress in addressing these six critical challenges areas in more detail in the following pages.

We have added a new challenge, Providing Oversight of Grants During a Pandemic, as well as included information within each section, to discuss challenges NSF faces in addressing the public health and economic crises resulting from the Coronavirus Disease 2019 (COVID-19) pandemic. NSF has procedures and plans in place to effectively manage the programs funded by the *Coronavirus Aid, Relief, and Economic Security Act* (CARES Act) and other related legislation. Its greater risks may be from the pandemic's impacts on institutions of higher education and other recipient organizations, which may extend to non-pandemic funding.

[1] The *National Science Foundation Act of 1950* (Pub. L. No. 81-507) sets forth the mission: "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes."

Introduction

In addition, we have included another new challenge, Increasing Diversity in Science & Engineering Education and Employment, also impacted by COVID-19. NSF's ongoing efforts to address this challenge may help mitigate the pandemic's impact on Science, Technology, Engineering, and Mathematics (STEM) research and education, including reported adverse impacts for Hispanic and Black STEM undergraduates and women STEM faculty and students.

The Foundation has already begun to identify risk areas, develop mitigation strategies, and determine financial impacts of the pandemic. We are monitoring NSF's efforts to ensure that its strategies for mitigating impacts are fully developed and address the areas of greatest concern.

Progress in Addressing FY 2020 Challenges

We have removed two challenge areas identified in our FY 2020 Management Challenges report — Meeting Digital Accountability and Transparency Act of 2014 (DATA Act) Reporting Requirements and Encouraging the Responsible and Ethical Conduct of Research. NSF continues to improve its DATA Act reporting and work closely with OMB, the U.S. Department of the Treasury, and intra-Governmental groups. In addition, we are encouraged by NSF's actions to strengthen training in the responsible conduct of research at NSF-funded institutions and its commitment to ensuring the research enterprise it supports is free of harassment. NSF has also continued to emphasize its culture of zero tolerance for harassment of any kind by NSF staff.

In last year's report, we identified a new area — managing the enterprise-wide internal control environment — that we considered an emerging challenge for NSF. NSF continues to make progress in this area, refining and strengthening its overall internal control environment and integrating Enterprise Risk Management into its planning and operations. NSF's quick response to the pandemic and handling of additional CARES Act funding demonstrate an ability to adapt quickly and implement enterprise-wide solutions. We will continue to monitor NSF's progress in this area.

NSF's effective responses to its serious management and performance challenges will continue to promote the integrity of NSF-funded projects, help ensure research funds are spent effectively and efficiently, and help maintain the highest level of accountability over taxpayer dollars.

CHALLENGE 1 Providing Oversight of Major Multi-User Research Facilities

Why is this a serious management challenge?

This challenge involves an operation that is critical to an NSF core mission.

As part of its mission, NSF funds the scientific community to manage the development, design, construction, and operation of major multi-user research facilities (major facilities), which are state-of-the art infrastructure for research and education that include telescopes, ships, distributed networks, and observatories. NSF's major facility portfolio is inherently risky because the facilities are technically complex, and their construction and operating costs are high. In FY 2019, NSF spent approximately $285 million constructing major facilities and more than $1 billion operating them.

Major facilities have always faced unknown risks — for example, a snapped cable recently damaged a radio telescope's antennae at one facility — but the advent of COVID-19 has added an unprecedented degree of complexity and uncertainty for their operations. Facility closures and safety precautions taken due to COVID-19 have delayed construction and research, as well as increased costs. This has resulted in NSF authorizing total project costs increases and the reprogramming of funds to cover these increases. In response to COVID-19, many existing facilities have been closed or required to operate with minimal staff. This has led to disruptions in data gathering and routine maintenance, as well as the postponement or cancellation of some planned scientific activities. The pandemic response has also halted or delayed the construction of new facilities.

NSF continues to work diligently to address recommendations from recent audits. For example, to improve its oversight of federally owned property, including vehicles, NSF has developed standard operating guidance via an agency-wide equipment working group. NSF also has revised its standard solicitation language to ensure facility operation proposals include risks and inflation factors.

NSF's major facilities program has continued to evolve and improve each year, cementing its place as a model program. Its work to identify risk areas, develop mitigation strategies, and assess financial impacts of COVID-19 will help position it to best address this challenge.

Completed Actions

- ☑ Required recipients to develop segregation of funding plans for projects, including the Daniel K. Inouye Solar Telescope, Vera C. Rubin Observatory, and AIMS.
- ☑ Revised standard solicitation language to ensure facility operation proposals include risks and inflation factors.
- ☑ Implemented policies and procedures to improve pass-through entities' oversight of subrecipients.
- ☑ Developed standard operating guidance for oversight of federally owned property.
- ☑ Issued *Obligation and Allocation of Management Reserve* standard operating guidance, which eliminates the $10 million applicability limit for use on construction projects impacted by the pandemic.

Ongoing Actions

- ➢ Issuing the revised *Business System Review Guide*, which now aligns with *Uniform Guidance*.
- ➢ Finalizing the *Major Facilities Oversight Reviews* standard operating guidance.
- ➢ Completing major facilities portfolio workforce gap analysis.

CHALLENGE 2 Providing Oversight of Grants During a Pandemic

Why is this a serious management challenge?

This challenge involves an operation that is critical to an NSF core mission. There is also risk of fraud, waste, or abuse of NSF or other Government assets.

Making grants in support of promising scientific research is NSF's primary business and a key element of its mission. COVID-19 has added complexity to the grant management process due to the need to expend additional Federal funds to address its impacts, as well as the health, economic, and societal impacts on NSF's recipient environment.

The CARES Act, enacted on March 27, 2020, provided NSF with a total of $76 million, including $75 million to support its ongoing grant response to COVID-19 and $1 million to assist in the administration of those grants. These funds include Rapid Response Research (RAPID) awards and are in addition to NSF's existing active grant portfolio, which totaled more than $33 billion in FY 2019. As we reported in May 2020, we found NSF's CARES Act Spending Plan to be reasonable, prudent, and consistent with the intent of the Act's funding objectives. NSF is using existing funding mechanisms with established policies, procedures, and controls to disperse the funds provided by the CARES Act, which reduces the risk of misuse and helps ensure accountability.

However, COVID-19 has introduced new and unique factors to which NSF must adapt to maintain effective grant accountability. For example, OMB issued multiple guidance documents authorizing temporary spending flexibilities that greatly expanded the allowable uses of grant funds. Accordingly, while some scientific activity moved to a virtual environment, other activities slowed due to facility closures and stay-at-home orders. This has created uncertainty about achieving grant objectives, especially those reliant upon field research, continuous use of cell lines, animal colonies, or human subject participation. In some cases, restarting research may be costly and original grant objectives may be unattainable. Some institutions may no longer be viable due to pandemic-driven fiscal constraints, including the need to refund portions of tuition; lower than anticipated tuition revenue; and declining support from state governments, endowments, or other sources of funding. If those factors lead to staff cuts in sponsored research offices or offices responsible for identifying and managing scientists' conflicts of interest and commitment, recipients' ability to ensure compliance with NSF award terms and conditions could be undermined.

NSF has begun planning how to address some of these risks, but uncertainty remains, especially as the pandemic continues. NSF may need to make difficult decisions about which grants to terminate, which to continue supporting at established funding levels, and which to support with supplemental funding — and it must consider how these decisions will impact the funding levels of future awards.

Completed Actions

- ☑ Fully obligated funding authorized by CARES Act.
- ☑ Issued CARES Act Spending Plan.
- ☑ Established the Recovery Planning Task Force to look at pandemic's impact on grantees and NSF.
- ☑ Developed NSF Coronavirus Information webpage to share COVID-19 guidance with the award recipient community.

Ongoing NSF Actions

- ➢ Finalizing high level strategy for identifying and responding to risks and impacts of COVID 19 on both the agency and its recipients.
- ➢ Reviewing individual requests for grant extensions and supplemental funding.
- ➢ Continuing to update and share COVID 19 guidance with the award recipient community.

CHALLENGE 3 Managing the Intergovernmental Personnel Act Program

Why is this a serious management challenge? This challenge involves an operation that is critical to an NSF core mission.

NSF gives scientists, engineers, and educators the opportunity to temporarily serve as NSF program directors, advisors, and senior leaders. Most non-permanent staff members are individuals assigned under the *Intergovernmental Personnel Act* (IPA, Pub. L. No. 91-648), who are not Federal employees but are paid through grants and remain employees of their home institutions. These individuals — hereafter referred to as IPAs or rotators — bring in fresh perspectives from across all fields of science and engineering to support NSF's mission. However, IPAs can have a heightened risk of conflicts of interest while working at NSF because most come from institutions receiving NSF grants. Also, because they only serve up to 4 years, there is frequent staff turnover at NSF, especially in senior leadership positions filled by IPAs. In addition, IPAs can spend up to 50 days each year on Independent Research/Development (IR/D) and their salaries are not subject to Federal pay and benefits limits.

NSF continues to strengthen its management of the program. For example, for all new IPA agreements initiated in FY 2017 and beyond, NSF requires every IPA's home institution, unless it requests a waiver, to pay 10 percent of the IPA's base salary and fringe benefits. An assessment indicated the cost-share percentage (based on the IPA's base salary and fringe benefits) gradually increased from 7.2 percent in FY 2016 to 10.4 percent in FY 2019. At the conclusion of FY 2019, NSF had realized significant cost avoidance with increased cost share dollars and participation rates each year.

COVID-19 has brought new and unique challenges to this program, including recruiting, onboarding, and managing IPAs in a remote work environment. It is unclear if institutions will be reluctant to allow staff to participate in the IPA program — and, if the number of IPAs decreases, whether NSF will be able to recruit qualified staff to fill any resulting openings. Fiscal concerns at institutions could also undermine the progress NSF has made in increasing cost-sharing for IPAs.

Completed Actions

- ☑ Submitted the IPA Program Annual Report.
- ☑ Approved IPA Cost Share Policy.
- ☑ Migrated executive-level IPAs along with NSF senior executive employees into USA Performance Management System.
- ☑ Submitted to Congress the FY 2019 annual response to the *American Innovation and Competitiveness Act* justifying rotator pay exceeding the maximum senior executive service pay.
- ☑ Integrated corrective actions in response to GAO report on renewing NSF goal of Adapting the Workforce to the Work.
- ☑ Engaged in IPA Program Enterprise Risk Management to clearly identify IPA Program objectives and associated risks.

Ongoing Actions

- ➢ Continuing to submit the IR/D Annual Report, covering program participation statistics, average days and dollars requested and used, and status of IR/D training and outreach.
- ➢ Continuing to provide annual training for IR/D experts, including updates to the IR/D Guide and the online electronic IR/D plan.
- ➢ Continuing to monitor turnover risk for IPAs.
- ➢ Continuing to use onboarding, training, knowledge transfer, and performance management systems in place to ensure that staff turnover has minimal impact on operations.

CHALLENGE 4 Providing Oversight of the Antarctic Infrastructure Modernization for Science (AIMS)

Why is this a serious management challenge?

This challenge involves an operation that is critical to an NSF core mission.

NSF, through the United States Antarctic Program (USAP), manages U.S. scientific research in Antarctica. Leidos Innovations Corporation (Leidos) currently holds the Antarctic Support Contract (ASC) for USAP logistical support. It is NSF's largest contract, valued at $2.3 billion over 13 years. NSF recently initiated a $410 million project to update and consolidate the footprint of McMurdo Station. The Office of Polar Programs (OPP), in coordination with the Division of Acquisition and Cooperative Support and the Large Facilities Office, is providing oversight of the Antarctic Infrastructure Modernization for Science (AIMS) project as a series of modifications to the existing ASC with Leidos and by following procedures in the *Major Facilities Guide*. This anticipated 10-year project, to be completed in phases, will stretch agency resources and may present additional challenges for NSF to overcome. OPP is also currently providing oversight of a separate ASC contract modification with Leidos to build an Information Technology & Communications (IT&C) primary facility — a key precursor to AIMS' success.

The advent of COVID-19 has added an unprecedented degree of complexity and uncertainty to the AIMS project. For example, while design and domestic fabrication of materials are continuing, AIMS construction on-ice at McMurdo has been put on hold and will require a complete rebaseline in FY 2021; the IT&C primary facility construction was also halted and will need rebaselining. Additionally, actions taken to keep Antarctica free of COVID-19, particularly those associated with rotating staff and contractors to and from the Antarctic continent, will have significant impacts on program operations and construction progress.

NSF has committed to completing the AIMS project with minimal impact on the scientific research that will continue to take place at McMurdo station. This commitment, the inherent risk of the ASC, the remote and isolated environment coupled with the harsh climate of Antarctica, the challenges presented by COVID-19, and the capacity of the prime contractor to effectively manage this complex project will require continued vigilance.

Completed Actions

- ☑ Partnered within NSF to identify areas the contractor needed to strengthen, which resulted in the contractor hiring additional staff, restructuring the office supporting the contract, and obtaining interagency support for cost analysis from the U.S. Army Corps of Engineers.
- ☑ Restructured the U.S. Army Corps of Engineers support being provided to the AIMS project by moving from cost reasonableness reviews to full independent cost estimates for proposal packages.
- ☑ Completed verification and acceptance of the AIMS Earned Value Management System in accordance with NSF policy.

Ongoing Actions

- ➢ Continuing oversight of the AIMS and IT&C Primary Addition Projects in accordance with established Internal Management and Project Execution Plans. Both projects require rebaselining due to COVID 19.
- ➢ Assessing COVID 19 impacts and evaluate options for minimizing negative impacts to AIMS cost and schedule.
- ➢ Working with the Office of Budget, Finance and Award Management to rebaseline AIMS, and subject the revised cost, scope, and schedule to external panel review, Facilities Readiness Panel Review, Director's Review Board Review, and National Science Board (NSB) re authorization of the Total Project Cost.

CHALLENGE 5 Increasing Diversity in Science & Engineering Education and Employment

Why is this a serious management challenge?

This challenge involves an operation that is critical to an NSF core mission.

In the Federal Government's 5-year strategic plan for STEM education, issued in December 2018, the Executive Office of the President's National Science and Technology Council reported:

> Women, persons with disabilities, and three racial and ethnic groups — Blacks or African Americans, Hispanics or Latinos, and American Indians or Alaska Natives — are significantly underrepresented in S&E [science and engineering] education and employment.

In August 2020, OMB directed 16 departments and agencies to prioritize investments that increase diversity, equity, and inclusion in STEM. Further, in its *Vision 2030*, the NSB estimated that to lead globally in S&E and to remain competitive, by 2030 the number of women in the S&E workforce must nearly double, the number of Black or African Americans must more than double, and the number of Hispanics or Latinos must triple compared to the respective numbers in the 2020 S&E workforce.

NSF maintains a comprehensive portfolio to increase diversity in S&E. The Broadening Participation portfolio focuses on awards with specific goals to increase participation of underrepresented groups. In addition, the NSF Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (NSF INCLUDES) program, one of NSF's Big Ideas, focuses on scaling up proven approaches to broadening participation. NSF has issued two progress reports on NSF INCLUDES. They document the work of grantees, lessons learned on building connections, and corporate and Federal partnerships designed to broaden participation in STEM nationwide. Further, at its July 29, 2020 meeting, the NSB discussed working with NSF on the broader impacts criterion of merit review to foster a more inclusive S&E workforce. Members noted the *American Innovation and Competitiveness Act of 2017* (Pub. L. 114-329) lists increasing diversity in STEM as a broader impacts goal for NSF.

Actions taken by NSF and the NSB help alleviate the impact of COVID-19 on efforts to increase diversity in STEM research and education. A recent NSF-funded study[2] — an early snapshot of an evolving situation — found that Hispanic (12.7 percent) and Black (10.3 percent) STEM undergraduates were more likely than those identifying as Asian (6.3 percent) and White (6.0 percent) to delay graduation, and women faculty and students reported being more adversely affected by remote learning than did their male counterparts. In FY 2021, we will monitor NSF's continued efforts to develop strategies and programs to increase diversity in S&E education and employment and to measure their effectiveness.

Completed Actions

- ☑ Issued biannual *Women, Minorities, and Persons with Disabilities in Science and Engineering* reports.
- ☑ With NSB, issued *2019 Science & Engineering Labor Force* report and *The State of U.S. Science and Engineering 2020*.
- ☑ Contributed to NSB's Vision 2030.
- ☑ Created and twice evaluated the NSF INCLUDES portfolio.

Ongoing Actions

- ➢ Clarifying Broader Impacts criterion of Merit Review.
- ➢ Continuing NSF INCLUDES' activities and evaluations.
- ➢ Continuing to share *Indicators*, a quantitative summary of the scope, quality, and vitality of the S&E enterprise over time and within a global context.

[2] Saw, G. K., Chang, C.-N., Lomelí, U., & Zhi, M. Fall Enrollment and Delayed Graduation Among STEM Students during the COVID-19 Pandemic ([Network for Research and Evaluation in Education] Data Brief No. 1), July 15, 2020

CHALLENGE 6 Mitigating Threats Posed by Foreign Government Talent Recruitment Programs

Why is this a serious management challenge?

There is a risk of fraud, waste, or abuse of NSF or other Government assets.

NSF, and other agencies that fund basic and advanced research, are facing increasing challenges from programs sponsored by some foreign governments or affiliates, referred to as "foreign government talent recruitment programs." These programs — designed to benefit the foreign state's economic development, industry, and national security by obtaining information and technology from abroad — have the potential to exploit the openness of American universities and threaten the integrity of U.S. research initiatives.

Talent recruitment programs target individuals with access to, influence over, or expertise in cutting-edge science, including NSF-funded researchers, merit review panelists, and career Federal employees or rotators who manage NSF's scientific programs. Some plans have required members to affirmatively demonstrate their involvement in research or technology development, sometimes by providing information that is proprietary. These plans often use contracts to establish the relationship between the plan and the researcher. The contracts can contain provisions related to the researcher's intellectual activities and outputs, which may raise significant questions about ownership of intellectual property developed with NSF funding and create conflicts of interests, time, and commitments. Failure to properly disclose membership in such programs can also have criminal or civil ramifications. In addition, many institutions funded by NSF could be affected by financial constraints driven by the pandemic, which could undermine their ability to identify and manage conflicts of interests, commitment, and affiliation created by researchers' involvement with such programs.

NSF has begun to take action to confront the challenges presented by foreign talent recruitment programs. NSF should continue to assess and refine its controls in this area and should work to ensure that it has sufficient staff and resources to respond to this challenge.

Required NSF IPA Program staff to be U.S. citizens or have applied for U.S. citizenship.

- ☑ Issued a personnel policy prohibiting NSF employees and IPA Program staff from participating in foreign government talent recruitment programs.
- ☑ Commissioned an independent study.
- ☑ Appointed an NSF Chief of Research Security Strategy and Policy to lead NSF's response.
- ☑ Published final 2020 *Proposal and Award Policies and Procedures Guide*, including clarifications regarding reporting requirements for current and pending support and professional appointments, to include participation in talent recruitment programs.
- ☑ Developed electronic formats for submission of biographies, appointment disclosures, and current and pending support information.
- ☑ Created science and security training for NSF staff.
- ☑ Issued new award terms and conditions regarding previously undisclosed information.

- ➢ Strengthening and improving certifications relating to representations and disclosures made in proposals and other ongoing communications with NSF during the lifecycle of the award.
- ➢ Continuing coordination with other Federal agencies on science and security policies.

Appendix A: References

Please visit http://www.nsf.gov/oig for additional reports and publications.

Introduction

- NSF OIG Report No. 2-2-003, *Fiscal Year 2019 Implementation of the Digital Accountability and Transparency Act of 2014 Performance Audit*, Nov. 8, 2019
- NSF OIG Report, *Management Challenges for the National Science Foundation in FY 2020*, Oct. 15, 2019
- NSF Office of the Director Staff Memorandum, O/D 18-18, NSF is Committed to Stopping Harassment in Research and Learning Environments, Sept. 19, 2018
- NSF Office of the Director Important Notice No. 144, *Harassment*, Feb. 8, 2018

Providing Oversight of Major Multi-User Research Facilities

- NSF OIG 20-2-007, *Audit of NSF's Monitoring of Government-Owned Equipment Purchased on NSF Awards*, August 26, 2020
- NSF OIG 20-2-006, *NSF Could Improve Accountability for Its Vehicle Fleet and Recipient-titled Vehicles at Major Facilities*, May 21, 2020
- NSF OIG 20-2-004, *Audit of NSF's Process for Evaluating the Operations and Maintenance Proposal for the Ocean Observatories Initiative*, April 14, 2020
- NSF OIG Report No. 19-2-006, *Audit of NSF's Controls to Prevent Misallocation of Major Facility Expenses*, June 21, 2019
- NSF OIG Report No. 18-2-005, *Audit of NSF's Oversight of Subrecipient Monitoring*, June 21, 2018

Providing Oversight of Grants During a Pandemic

- Pandemic Response Accountability Committee, *Top Challenges Facing Federal Agencies: COVID-19 Emergency Relief and Response Efforts*, June 2020
- NSF OIG Report No. 20-6-001, *Review of the National Science Foundation CARES Act Spending Plan*, May 21, 2020
- NSF Coronavirus Information Website

Managing the Intergovernmental Personnel Act Program

- NSF OIG Report No. 17-2-008, *NSF Controls to Mitigate IPA Conflicts of Interest*, June 8, 2017

Increasing Diversity in Science & Engineering Education and Employment

- Office of Science and Technology Policy of the Executive Office of the President, *Charting a Course for Success: America's Strategy for STEM Education*, December 2018
- OMB M-20-20, *Fiscal Year 2022 Administration Research and Development Budget Priorities and Cross-Cutting Actions*, August 14, 2020
- NSB Report No. NSB-2020-15, *Vision 2030*, May 2020
- Saw, G. K., Chang, C.-N., Lomelí, U., & Zhi, M. *Fall Enrollment and Delayed Graduation Among STEM Students during the COVID-19 Pandemic* ([Network for Research and Evaluation in Education] Data Brief No. 1), July 15, 2020
- National Science Board, National Science Foundation, NSB-2019-8: *Science and Engineering Indicators 2020: Science and Engineering Labor Force*, September 2019
- National Science Board, National Science Foundation, NSB-2020-1: *Science and Engineering Indicators 2020: The State of U.S. Science and Engineering*, January 2020

Additional Information

About NSF OIG

We promote effectiveness, efficiency, and economy in administering the Foundation's programs; detect and prevent fraud, waste, and abuse within NSF or by individuals who receive NSF funding; and identify and help to resolve cases of research misconduct. NSF OIG was established in 1989, in compliance with the *Inspector General Act of 1978*, as amended. Because the Inspector General reports directly to the National Science Board and Congress, the Office is organizationally independent from the National Science Foundation.

Obtaining Copies of Our Reports

To view this and any of our other reports, please visit our website at: www.nsf.gov/oig.

Connect with Us

For further information or questions, please contact us at oig@nsf.gov or 703.292.7100. Follow us on Twitter at @nsfoig. Visit our website at www.nsf.gov/oig.

Report Fraud, Waste, Abuse, or Whistleblower Reprisal

- File online report: https://www.nsf.gov/oig/report-fraud/form.jsp
- Anonymous Hotline: 1.800.428.2189
- Mail: 2415 Eisenhower Avenue, Alexandria, VA 22314 ATTN: OIG HOTLINE

National Science Foundation
Office of the Director

October 22, 2020

MEMORANDUM

TO: Ms. Allison Lerner
Inspector General, National Science Foundation

FROM: Dr. Sethuraman Panchanathan
Director, National Science Foundation

SUBJECT: Acknowledgement of the Inspector General's FY 2021 Management Challenges Report and Transmittal of NSF's Progress Report for the FY 2020 Management Challenges

---

As Director of the National Science Foundation (NSF), I recognize the importance of acknowledging, understanding, and mitigating risk to the execution of our mission and proper stewardship of taxpayer dollars. The Office of Inspector General's (OIG) yearly Management Challenges, which are required by statute, are an important part of NSF's risk management processes. The pandemic this year demonstrated that, while there may be unforeseeable risks, established risk management processes well-position NSF to address emerging challenges. To that end, this memorandum provides you with NSF's Progress Report for the OIG Management Challenges for FY 2020 and acknowledges my receipt of the OIG's Management Challenges for NSF for FY 2021, dated October 15, 2020. As you review our Progress Report and the new challenges, here are three considerations:

First, we are pleased that the OIG has removed two challenges identified in the FY 2020 Management Challenges report — Meeting Digital Accountability and Transparency Act of 2014 (DATA Act) Reporting Requirements and Encouraging the Responsible and Ethical Conduct of Research.

Second, we appreciate the OIG's acknowledgement of the progress NSF is making in managing the enterprise-wide internal control environment, an area identified by the OIG last year as a potential challenge. More generally, we recognize the benefit of the OIG's identification of potential or emerging challenges, as it provides NSF the opportunity to investigate and address concerns before they could amplify.

Third, I am engaging the Chief Operating Officer, Assistant Directors, and the Chief Financial Officer to identify owners and paths forward, for each of the six management challenges identified for FY 2021, as noted below:

- Providing Oversight of Major Multi-User Research Facilities
- Providing Oversight of Grants During a Pandemic
- Managing the Intergovernmental Personnel Act Program

2415 Eisenhower Avenue, Suite 19100 Alexandria, VA 22314

- Providing Oversight of the Antarctic Infrastructure Modernization for Science (AIMS) Project
- Increasing Diversity in Science & Engineering Education and Employment
- Mitigating Threats Posed by Foreign Government Talent Recruitment Programs

As always, NSF remains committed to serving the research community effectively, to continually improving stewardship across the agency, and to safeguard Federal funds awarded by NSF in support of the agency's mission. We look forward to continuing to work with your office to achieve those goals.

Sethuraman Panchanathan

Attachments

cc: Chair, National Science Board
Chair, National Science Board, Committee on Oversight
Chief Financial Officer

National Science Foundation (NSF)
FY 2020 Progress Report on OIG Management Challenges

MANAGEMENT CHALLENGE 1: Managing Major Multi-User Research Facilities

NSF Lead: Teresa Grancorvitz, Chief Financial Officer and Jim Ulvestad, Chief Officer for Research Facilities

Summary of OIG Identified Challenge

a) *Manage inherent risk associated with previously highlighted OIG concerns, including the need for strengthened controls to ensure major facilities clearly identify subrecipients, complete subrecipient risk assessments, and properly charge project expenditures to construction or operations.*
b) *Ensure that NSF and recipients constructing and operating major facilities maintain project management expertise.*

NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge

NSF understands the importance of its role in overseeing recipients' on-going management of major facilities. The agency also recognizes the importance of assessing prospective recipients' capabilities for managing major facilities prior to award. Over the past several years, NSF has greatly strengthened its oversight policies and procedures. This includes an annual Major Facilities Portfolio Risk Assessment to determine the necessary reviews and audits to be conducted by the Large Facilities Office (LFO) and Cooperative Support Branch (CSB) within the Office of Budget, Finance and Award Management (BFA). In close cooperation with NSF program offices, LFO and CSB conduct these reviews to safeguard NSF's significant, long-term investments in supporting the scientific endeavor.

NSF leadership continues to show its commitment to major facilities oversight through the active engagement of the Chief Officer for Research Facilities (CORF) and leadership's periodic review of the Office of the Director's Watch List. The governance structure currently in place, which includes the Accountable Directorate Representatives, Facilities Governance Board, Facilities Readiness Panel, and the Director's Review Board, continues to help ensure consistent implementation of NSF's expanded controls for major facilities oversight. Furthermore, NSF is ensuring adequate human capacity through implementation of the Program Management Improvement Accountability Act (PMIAA) on the major facility/acquisition portfolio for NSF staff overseeing major facility awards, and by establishing guidance on the necessary core competencies for recipient staff managing major facilities.

Since 2017, NSF has been through three Government Accountability Office (GAO) reviews related to its oversight of projects funded from the Major Research Equipment and Facilities Construction (MREFC) account. The June 2018 report entitled *National Science Foundation: Revised Policies on Developing Costs and Schedules Could Improve Estimates for Large Facilities* (GAO-18-370) recommended that NSF revise its policies for estimating and reviewing the costs and schedules of major facility projects to better incorporate the best practices in GAO's

guides. The March 2019 report entitled *National Science Foundation: Cost and Schedule Performance of Large Facilities Construction Projects and Opportunities to Improve Project Management* (GAO-19-227) recommended that NSF conduct a workforce gap analysis for project management competencies, ensure recipients provide lessons learned and best practices to NSF, and establish criteria for recipient project management competencies to be incorporated into NSF's review process. The April 2020 report entitled *National Science Foundation: Cost and Schedule Performance of Major Facilities Construction Projects and Progress on Prior GAO Recommendations* had no new recommendations. NSF has Corrective Action Plans (CAPs) in place as described below.

The COVID-19 pandemic presents unique challenges for major facilities, including protecting the safety of personnel and property, construction delays, and unanticipated additional costs given that it is considered an "unforeseen event." The greatest risk is the inadvertent misuse of funds when re-budgeting (Operations Stage awards) and the proper use of budget contingency funds (Construction Stage awards). Following the flexibilities granted through OMB guidance under the pandemic, NSF is taking action to address these risks by developing internal and external guidance for major facility programs and recipients. These efforts have included the following: (1) developing and updating a set of frequently asked questions (FAQs) specific to major facility recipients as a complement to NSF's implementation of Office of Management and Budget (OMB) Guidance; (2) issuing guidance jointly from the Office of the Director (OD) and the Large Facilities Office (LFO) to NSF Program Offices in response to the COVID-19 pandemic to ensure recipients segregate and track related cost increases; and (3) providing guidance for addressing re-baselining of construction projects and the application of management reserve for this unforeseen event. NSF will be following its current policies and controls with only minor clarifications. No additional controls are deemed necessary.

Based on NSF's evaluation of this Management Challenge under Enterprise Risk Management (ERM), coupled with activities already completed and those planned for FY 2020, NSF has determined that the residual risk impact for fraud, waste and abuse (Risk 1) is "low" and the likelihood is "very low" and that the residual risk impact for scientific performance (Risk 2) is "moderate" and the likelihood is "very low." Risk 2 impact and likelihood assume sufficient additional funding is made available. NSF is confident that its current and planned controls related to major facility oversight adequately consider and balance risk, resources, benefit to the science community, and stewardship of federal funds.

The planned corrective actions, demonstrated progress, and monitoring activities are described below.

NSF's Corrective Actions to Address the Challenge

Demonstrated Progress Through Agency Actions Taken in Prior Fiscal Years (FY 2016 - 2019)

Since 2015, NSF has implemented enhanced controls and strengthened agency governance to fully address the recommendations of the 2015 National Academy of Public Administration report; the requirements of the American Innovation and Competitiveness Act of 2017 (AICA); the FY 2018 and FY 2019 GAO Review Reports; and numerous OIG report recommendations. Examples of recent (FY 2019) agency actions include the following:

- Addition of the Chief Officer for Research Facilities (CORF) in the Office of the Director and Accountable Directorate Representatives; formation of the Major Facilities Working Group, Facilities Readiness Panel, and Facilities Governance Board; and implementation of Integrated Project Teams.
- Revised the *Major Facilities Guide* (MFG; NSF 19-68, September 2019) to include:
  - Created new Section 4.3 - *Schedule Development, Estimating, and Analysis.*

  - Requirement for Segregation of Funding Plan (as part of the Project Execution Plan) which requires recipients to describe how they allocate expenses between Construction and Operation Stage awards, particularly when awards overlap in duration.
  - Language describing the intent of the final Construction Stage review in determining whether the required project scope to meet science requirements was delivered in accordance with the Project Execution Plan and the impact on operations for any deferred work packages.
- Initiated major facilities portfolio workforce gap analysis as part of PMIAA implementation and the CAP for GAO-19-227.
- Revised Major Facilities Cooperative Agreement Supplemental Terms and Conditions (and any major facility contract terms and conditions) to require recipients to participate in NSF's Knowledge Management Program as part of the CAP for GAO-19-227.
- Drafted the new *Major Facilities Oversight Reviews* Standard Operating Guidance (SOG) to utilize external review panels more fully in addressing elements of cost and schedule and to evaluate the competencies of Recipient Key Personnel (GAO-18-370 and GAO-19-227).
- Drafted new MFG Section on *Key Personnel* as part of CAP for GAO-19-227.

Demonstrated Progress Through Agency Actions Taken in FY 2020

- Required recipients to develop Segregation of Funding Plans for the following NSF projects: Daniel K. Inouye Solar Telescope (DKIST), Vera C. Rubin Observatory (formerly Large Synoptic Survey Telescope, or LSST), Antarctic Infrastructure Modernization for Science (AIMS), Regional Class Research Vessel (RCRV), and Large Hadron Collider Hi-Luminosity Upgrade (HL-LHC) Program (the CMS and ATLAS projects).
- Converted Director's Watch List to Office of the Director's Watch List under cognizance of the Chief Officer for Research Facilities, formalizing the process of tracking open action items on a monthly to bi-monthly interval.
- Ensured that the AIMS project has Federal Acquisition Regulations (FAR)-compliant procedures in place, including requirements for expending funds for established purposes, tracking and billing of costs incurred, and record-keeping for audit comparable to Segregation of Funding Plans under cooperative agreements.
- Revised the *Business Systems Review (BSR) Guide* to better align with the Uniform Guidance and address implementation of Segregation of Funding Plans and the allocation of expenses during the Construction and Operations Stages (if identified as a risk).
- Implemented corrective actions in response to all OIG recommendations under OIG Report 18-2-005 *Audit of NSF's Oversight of Subrecipient Monitoring,* which included updating various NSF policies and procedures to: (1) align with the Uniform Guidance; (2) provide a specific mechanism to verify that Pass-through entities (PTEs) of large and complex awards complete subrecipient risk assessments; and (3) to require that PTEs clearly identify entities that will receive a subaward.

NSF's Anticipated Action Plan Milestones

NSF management developed the following anticipated milestones in consideration of NSF's strategic and operational objectives and the previous actions NSF has already taken as described above:

- Revise *Obligation and Allocation of Management Reserve* SOG (NSF-LFO-FY19-02-00) to clarify the relation to the NSB delegation order and eliminate the $10 million applicability limit for use on construction projects impacted by the COVID-19 pandemic [FY 2020, Q3].

- Finalize the *BSR Guide* and post for public comment [FY 2020, Q4].
- Finalize the *Major Facilities Oversight Reviews* SOG and provide to the OIG for consideration in closing the resolved recommendation in OIG Report 19-2-006, *Audit of NSF's Controls to Prevent Misallocation of Major Facility Expenses* [FY 2020, Q4].
- Complete the major facilities portfolio workforce gap analysis as part of Program Management Improvement Accountability Act (PMIAA) implementation and the CAP for GAO-19-227 [FY 2020, Q4].
- Finalize and post interim update to the MFG for public comment [FY 2021, Q1], including:
  - Content in the new MFG Section 4.3, *Schedule Development, Estimating, and Analysis.*
  - More detailed guidance on Segregation of Funding Plans and provide to the OIG for consideration in closing resolved recommendations in OIG Report 19-2-006, *Audit of NSF's Controls to Prevent Misallocation of Major Facility Expenses.*
  - New section(s) on *Key Personnel* and *Recipient Core Competencies.*
- Monitor allocation of funds between awards as part of required cost incurred audits using Segregation of Funding Plans as reference [on-going].

MANAGEMENT CHALLENGE 2: Meeting DATA Act Reporting Requirements

NSF Lead: Teresa Grancorvitz, Chief Financial Officer and Wonzie Gardner, Office Head, Office of Information and Resource Management (OIRM)

Summary of OIG Identified Challenge

In OIG Fiscal Year (FY) 2019 performance audit of NSF's implementation of the Digital Accountability and Transparency Act (DATA Act), the audit report (OIG 20-2-003) noted that "[data reviewed] did not meet OMB quality requirements [and several] data elements were inaccurate, incomplete, or untimely". Most of these OIG-identified errors were related to specific award actions, notable award closeout transactions, and post-closeout upward and downward modifications, that are not captured in NSF's Awards System. The report also acknowledged that although NSF has improved its DATA Act reporting, "challenges remain in implementing a process to ensure all award actions are transparent to the public".

NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge

NSF is confident in the quality of our quarterly and monthly data submissions. The data submitted includes the required linkages between the submission files, the differences are legitimate and documented, and NSF's internal controls support the reliability and validity of the agency account-level and award-level data. NSF does not agree with the OIG's finding that the NSF award and financial systems must reconcile exactly. The data that the OIG pulled and identified as errors are not designated as "errors" in the Department of Treasury's (Treasury) DATA Act Information Model Schema (DAIMS) technical requirements, but are actually broker "warnings", which are previously disclosed as explainable differences between File C and D2.

NSF stores the original award amount and the true award actions (amendments) for additional funding, no-cost extensions and other administrative amendments in its award management system (Awards). NSF maintains

information regarding all financial award actions interfaced from Awards, outlays/expenditures, and accounting adjustments (resulting from award close and post-award close actions) in its financial management system (iTRAK). The policy of maintaining award close-out and post-award actions in iTRAK is in compliance with the Office of Management and Budget's (OMB) Uniform Grant Guidance (2 CFR 200). A unique Federal Award ID link exists between the two systems, providing full traceability for transactions that are interfaced from Awards to iTRAK, as required by the DATA Act guidance from OMB and Treasury (OMB M-15-12 and DAIMS specifications). The specific difference in interpretation between NSF and the OIG is whether the non-financial system should be used as an accounting ledger or sub-ledger.

NSF has communicated with OMB and Treasury requesting further guidance on this issue, and we have received several responses that support our position.

- On October 3, 2019, NSF received an email from Treasury that noted that DAIMS Policy and Procedures Guide does not provide detailed policy requirements for what should be in the award system and recommended agencies defer to FAR and 2 CFR 200 as well as OMB.
- On October 16, 2019, NSF received an email from OMB that confirmed our interpretation of 2 CFR 200, validating our approach of managing award activity between the award system and the financial management system.
- On October 24, 2019, NSF received an email from Treasury that validated NSF's opinion that the DAIMS Practices and Procedures contains no absolute requirement to have a one-to-one match between Files C and D2.
- On February 24, 2020, NSF provided OIG a walkthrough of various interactions with OMB and Treasury as well as additional clarifications on NSF data and its representation on USASpending.gov which also included a confirmation from Treasury that the "Obligation Amount" on USAspending.gov is pulled from File D2.

Since February, NSF has been in constant communication with OMB and Treasury through Leveraging Data As a Strategic Asset (LDASA) and Chief Financial Officers Council (CFOC) meetings on revising documentation to further address these explainable differences. Although we are working to resolve this issue before the next audit, Treasury has deferred documentation updates to future DAIMS releases. NSF is also currently undergoing a Government Accountability Office (GAO) audit in which we have explained the nature of the abovementioned recommendation and how it relates to our standard business processes. Since this regular business process comprises the majority of our submission warnings, we look forward to GAO's interpretation of the issue and related feedback at the conclusion of the audit.

The NSF business process that is used for recording and reporting these transactions to USASpending.gov is fully aligned with the DATA Act and applicable guidance (e.g., OMB M-17-04, and Treasury DAIMS technical guidance). Our monthly Financial Assistance Broker System (FABS) submission process ensures that reportable award actions from the Awards system are validated and reviewed by the stakeholders before publishing on USASpending.gov. NSF has also updated its Data Quality Plan (DQP) to note that the agency considers these adjustments as non-addressable, acceptable differences between Files C and D2. NSF accounts for these differences as part of its quantitative and qualitative materiality considerations, and monitors adjustments for significant increases to the risk of misstatement via its newly implemented Award Reconciliation Report. Further, NSF implemented a Quarterly Retrospective to review outstanding discrepancies and final dispositions of warnings, consider dollar materiality of issues, and document lessons learned for subsequent quarters.

Through this process, NSF validates that all addressable warnings identified within monthly reporting cycles were addressed at the time of certification to provide full transparency to the public over its award actions.

NSF's Corrective Measures to Address the Challenge

Demonstrated Progress Through Actions Taken in Prior Fiscal Years (FY 2019)

- Actively participated in the Chief Financial Officer Council (CFOC) DAIMS workgroup on data quality improvements, which is a cross-agency group led by Treasury for introducing potential improvements to the DAIMS specifications for improving data quality on USASpending.gov.
- Continued ongoing work, through the NSF Deputy Chief Financial Officer (DCFO) and staff, with the joint working group of the CFOC and the Council of the Inspectors General on Integrity and Efficiency (CIGIE) to provide input and recommendations around the next iteration of DATA Act policies, internal control, and audit guidance to OMB, Treasury, and CIGIE.
- Committed the NSF DCFO to leading a subgroup on internal controls, serving as primary author of a government-wide DATA Act Playbook, and actively participating in developing best practices for financial assistance data quality.
- Instituted processes to monitor and independently validate the effectiveness and sustainability of data quality measures. The NSF DATA Act Working Group worked with appropriate stakeholders from the Internal Controls and Enterprise Risk Management groups in developing and executing a data quality plan that would define NSF's FY 2019 approach to achieve reasonable assurance for internal control over quarterly DATA Act reporting. The plan was prepared in accordance with OMB M-18-16, *Appendix A to OMB Circular No. A-123*.
- Conducted a risk assessment of the 57 essential reporting elements related to procurement, financial management, and financial assistance data and submission processes and reviewed related system controls and Standard Operating Procedures (SOPs).
- Performed analysis of NSF's submission warnings to provide warning rationales, counts, and frequency of each identified warning during the execution phase of the data quality plan. This practice will continue with each quarterly submission and be reported in the annual assurance document.
- Updated documentation of DATA Act processes including, the DATA Act SOPs, Financial Assistance Broker System (FABS) Standard Operating Guidance, and NSF Acquisition Manual.
- Created a desk guide for the NSF Contracts Branch that includes step-by-step instructions intended to reduce recurring data errors.
- Implemented a SharePoint tool to assist in quarterly DATA Act submission processes by tracking Division Director assurances and the Senior Accountable Officer (SAO) certification.

Demonstrated Progress Through Actions Taken in FY 2020

- Corresponded with Treasury and OMB to get further clarity on the linkage requirements between Files C and D2 and to inform updates to Treasury DAIMS specifications that will provide more specific guidance on NSF's legitimate differences.
- Migrated reporting functionality from NSF's custom solution into iTRAK so that all reporting is now conducted directly out of NSF's financial system of record, with reconciliation reports also implemented into iTRAK directly.
- Implemented a SharePoint tool to assist in quarterly DATA Act submission process by tracking Division Director assurances and the SAO certification.

- Implemented an NSF Award Reconciliation Report to identify potential data issues across financial and award files and assign dollar impact and preliminary root causes to these issues to help report all addressable warnings.
- Incorporated lessons learned from feedback on data submissions to improve accuracy and efficiencies.
- Continued to work closely with OMB, Treasury, and intra-governmental groups to provide input into DATA Act technical guidance and policy
- Updated NSF's DQP for FY 2020 to provide an executive level summary of key and supplemental controls to ensure the completeness, accuracy, and timeliness of DATA Act submissions. This update includes new procedures developed and implemented to meet DAIMS 2.0 and OMB M-20-21 requirements.
- Updated DATA Act and FABS policies and procedures to reflect DAIMS 2.0 and OMB M-20-21 enhancements.
- Continued collaboration with NSF OIG and GAO to cooperate with and support their audit responsibilities as well as to resolve any recommendations through implementing a corrective action plan.

NSF's Anticipated Action Plan Milestones

NSF management developed the anticipated milestones below in consideration of NSF's strategic and operational objectives, the risks inherent to achieving these objectives, and the key actions NSF has already taken to address those risks.

- Incorporate recommendations from the GAO audit into NSF's reporting processes and controls.
- Continue to provide feedback to OMB and Treasury on recommended guidance changes that will help clarify the nature of NSF's legitimate differences, and reference to-be-published guidance in NSF policies and procedures.
- Continue to work with the OIG to achieve a common understanding and resolution of this issue.

MANAGEMENT CHALLENGE 3:
Managing the Intergovernmental Personnel Act (IPA) Program

NSF Leads: Wonzie Gardner, Office Head, OIRM and Joanne Tornow, Assistant Director, BIO

Summary of OIG Identified Challenge

IPAs can have a heightened risk of conflicts of interest while working at NSF because most IPAs come from institutions receiving NSF grants. The IPA program remains an area with inherent risk that NSF must continue to monitor and mitigate, because:

a) IPAs serve in a temporary capacity for up to 4 years, there is frequent turnover in staff at NSF, especially in senior leadership positions filled by IPAs.
b) IPAs can spend up to 50 days each year on Independent Research/Development (IR/D).
c) IPAs are not subject to Federal pay and benefits limits.

NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge

NSF provides the opportunity for scientists, engineers, and educators to rotate into the Foundation as temporary Program Directors, advisors, and leaders. Rotators bring fresh perspectives from across the country and across all fields of science and engineering supported by the Foundation, helping influence new directions for research in science, engineering, and education, including emerging interdisciplinary areas. Many of these rotators remain involved in their professional research and development activities while working at NSF through participation in the IR/D program, which is overseen by the NSF IR/D Council.

NSF takes a proactive approach in the management of the IPA Program to appropriately consider and mitigate inherent risks associated with its execution.

Demonstrated Top Leadership Commitment:
The IPA Steering Committee reports directly to the NSF Director and Chief Operating Officer (COO) and has been in place since April 2016. The IPA Steering Committee is comprised of senior-level leadership across the agency, namely a Chair and Vice-Chair who are part of the agency's Senior Executive Service (SES), the Chairs of the NSF Executive Resources Board (ERB) and IR/D Council, Head of the Office of Diversity and Inclusion, and four at-large members, including two SES and two executive-level IPAs.

The IPA Steering Committee is charged with ensuring NSF is best utilizing the IPA hiring authority. It advises the Foundation's senior leadership on matters that directly concern policy on the use of the IPA Program, and on common approaches to budgeting and implementation of the program. It also regularly reports on its oversight and stewardship of the IPA Program, including costs associated with the program, to the Director and COO, the Office of Management and Budget (OMB), and Congress, pursuant to the American Innovation and Competitiveness Act (AICA).

Capacity:
The IPA Steering Committee is supported in the execution of its responsibilities by various NSF units with key expertise for risk management, reporting, and accountability, including BFA, the OIRM's Division of Human Resource Management, the Office of General Counsel (OGC), the Office of Legislative and Public Affairs, and the Office of Integrative Activities.

Demonstrated Progress:
NSF engages in continuous improvement of its management of the IPA Program, addressing the management challenges identified by the OIG as well as other agency-identified risks and challenges. In this way, NSF is ensuring the program fully supports the mission of the agency and the Nation's interests. Indeed, NSF believes that the steps taken to date as described above have reduced the inherent risk substantially, such that the residual risk is acceptable to the agency. One example is NSF's work to resolve and close the recommendations from OIG report 17-2-008, *NSF Controls to Mitigate IPA Conflicts of Interest*. The last of the four recommendations from this report was closed by the OIG in October 2018. This result demonstrates that NSF has effectively minimized the inherent risk of IPA conflicts of interest while working at NSF (since most IPAs come from institutions receiving NSF grants). NSF is confident that these actions taken in response to prior OIG recommendations and ongoing monitoring and controls have mitigated the potential risks associated with managing IPAs' COIs.

NSF's Corrective Measures to Address the Challenge

Demonstrated Progress Through Actions Taken in Prior Fiscal Years

a) *Because individuals serve in a temporary capacity for up to 4 years, there is frequent turnover in staff at NSF, especially in senior leadership positions filled by IPAs.*

- Ensured there is a "bench" of staff ready to fill developmental detail assignments to vacant executive positions who have been trained at the Federal Executive Institute (FEI), American University Executive Leadership Program, Harvard Business School Leadership Training, Individual Development Plans, and NSF Academy Leadership Development Program.
- Implemented the New Executive Transition Program (NeXT) in 2009 to onboard employees and IPAs transitioning into executive-level positions to help new executives reach full performance as quickly as possible by developing executive knowledge about NSF mission, culture, organization, people, and business processes.
- Instituted mandatory training for Program Officers, including IPAs, on NSF's Merit Review process which teaches how research proposals are evaluated and how to execute the Program Officer role.
- Created a parallel performance management system in 2014 for IPAs to ensure clarity in setting expectations and providing feedback on performance.
- Established a knowledge transfer process in 2015 that exiting IPA executives can use to transfer knowledge and information to incoming executives.
- Implemented a required three-day supervisory training and development course in 2015 called Federal Supervision at NSF designed to assist new federal supervisors (including IPAs) in understanding their roles and all the requirements pertaining to federal human capital management.
- Established a Steering Committee for Policy and Oversight of the IPA Program (IPA Steering Committee) in April 2016 to serve as the primary body for considering policy on NSF's use of IPAs, and to oversee common approaches to budgeting and implementation of the IPA program.

- Produced IPA Program Annual Reports for the Director of NSF, beginning in 2018. This report provides annual data and trend analyses on various aspects related to the use of IPAs at NSF for use by the Director and NSF senior managers in assessing and overseeing the program.
- Developed the Corrective Action Plan (CAP) response to the GAO report, *A Workforce Strategy and Evaluation of Results Could Improve Use of Rotating Scientists, Engineers, and Educators* (GAO-18-533).

b) *IPAs can spend up to 50 days each year on Independent Research/Development (IR/D).*

- Established the IR/D Council in October 2011 to develop and monitor internal controls related to the IR/D Program, including tracking the time spent on IR/D activities. Data from these internal controls are disseminated to NSF senior management quarterly for use in managing the IR/D Program within each organization.
- Developed an IR/D Guide in 2012 to clearly communicate NSF policies on the use of IR/D, including the possibility that participation in the IR/D Program could be curtailed if it compromised the completion of NSF duties.
- Designated IR/D experts in each Directorate/Office who receive annual training to ensure that NSF IR/D policies are implemented appropriately.
- Instituted a requirement that all IR/D plans provide an explanation of how the IR/D activities enhance the requestor's ability to perform NSF duties.
- Published a revised IR/D Guide in January 2017 that includes guidance limiting NSF payment of IPAs' IR/D travel to their home institutions to 12 trips per year. The guidance encourages IPAs to combine other NSF official business and/or telework with these trips to more efficiently use travel dollars.
- Delivered a "Benefits of the NSF IR/D Program" report to the NSF Deputy Assistant Directors (DADs) in March 2018 highlighting the value of IR/D in recruitment, research currency, and ethics protection.
- Monitored time spent on IR/D by both permanent and rotating staff, and provided quarterly data to NSF senior managers to ensure appropriate oversight of IR/D.
- Performed yearly data checks to assure that no IPA IR/D participant travel was paid by NSF in excess of 12 trips per year.

c) *IPAs are not subject to Federal pay and benefits limits.*

- NSF initiated a pilot requiring 10% cost sharing by IPAs' home institutions of their academic-year salaries and fringe benefits (per NSF Bulletin 16-11). This pilot applies to all new IPA agreements initiated in FY 2017 and beyond, including those for executive and program level staff. Additionally, NSF eliminated reimbursement for lost consulting. An assessment of the pilot indicated that the cost-share percentage increased from 7.2% in FY 2016 to 7.9% in FY 2017 to 9.2% in FY 2018 and to 10.4% in FY 2019. At the conclusion of FY 2019, NSF had realized significant cost avoidance with increased cost share dollars and participation rates each year.
- Engaged with the GAO on the salary reimbursements associated with IPAs. As noted in the GAO report, IPAs remain employees of their home institutions, with NSF reimbursing the institutions for most of their salaries and benefits. NSF does not set the salaries for rotators who are detailed to NSF using the IPA authority because their salaries are set by their home institutions.
- Submitted to Congress annual responses to the AICA (P.L. 114-329 Section 111 on Personnel Oversight) on the Justifications for Rotator Pay Exceeding the SES Pay Max.

Demonstrated Progress Through Actions Taken in FY 2020

a) *Because individuals serve in a temporary capacity for up to 4 years, there is frequent turnover in staff at NSF, especially in senior leadership positions filled by IPAs.*

- Submitted the IPA Program Annual Report covering the prior fiscal year to the Director of NSF.
- Integrated activities associated with the CAP in response to GAO-18-533 into Renewing NSF goal 1 Adapting the Workforce to the Work.
- Engaged in IPA Program Enterprise Risk Management to clearly identify IPA Program objectives and associated risks as they pertain to the mission of NSF.
- Established implementation plan to Integrate Program level and Executive level IPAs into the USA Performance Management System in FY21.

b) *IPAs can spend up to 50 days each year on Independent Research/Development (IR/D).*

- Continued the IR/D Program, which permits employees and individuals performing temporary service with NSF to maintain their involvement with their professional research and research-related activities. Prior to creating an IR/D plan, participants must receive approval from their supervisor for the time and expense related to the submitted activities. Additionally, the plan needs to be approved by the Division Director and designated IR/D Expert from the organization. IR/D activities may not interfere with other assigned NSF duties and may be curtailed at management's or the participant's discretion.
- NSF continued to maintain robust oversight, training, and internal controls to monitor use of the IR/D program as demonstrated by these actions taken in FY 2020.
- Submitted the IR/D Annual Report to the DADs, covering program participation statistics, average days and dollars requested and used and status of IR/D training and outreach.
- Provided annual training for IR/D experts, including updates to the IR/D Guide and the online electronic IR/D plan.
- Provided quarterly data to NSF senior managers to ensure appropriate oversight of IR/D time and travel by both permanent and rotating staff.
- Continued to perform yearly data check to assure that there are no IPA IR/D participants where NSF payment of travel to their home institutions exceeds 12 trips per year.

c) *IPAs are not subject to Federal pay and benefits limits.*

- Submitted the FY 2019 IPA Program Annual Report to OD, which demonstrated that the 10% cost-share pilot has reduced/eliminated the gap between IPA reimbursements and Fed salaries, and thus this is not a major risk to the agency.
- Effective January 16, 2020, informed by the data in the IPA Program Annual Report, NSF implemented the 10% Cost Share Policy for Personnel on Intergovernmental Personnel Act (IPA) Assignment to NSF. Submitted to Congress the FY2019 annual response to the AICA on the Justifications for Rotator Pay Exceeding the SES Pay Max.
- NSF is preparing a brief report to GAO that will highlight the efforts of the agency surrounding the IPA Cost Share Policy and address concerns surrounding IPA costs at the Foundation.

NSF's Anticipated Milestones

NSF management developed the anticipated milestones and responses to the findings in the OIG Management Challenge FY 2020 Report below in consideration of NSF's strategic and operational objectives, the risks inherent to achieving these objectives, and the key actions NSF has already taken in response to those risks.

a) *Because individuals serve in a temporary capacity for up to 4 years, there is frequent turnover in staff at NSF, especially in senior leadership positions filled by IPAs.*

- NSF conducted an analysis (January 2018) on IPA years of service and found that, on average, IPA executives serve 3.1 years at NSF and are 3 times more likely to stay for 3-4 years compared to staff-level IPAs. Non-executives serve, on average, 2.3 years at NSF. Per OPM, the average time a career SES spends in a position is 3.4 years and non-career SES is 1.7 years.[1]
- Thus, the turnover risk for IPAs is not any greater than for other employees. NSF will continue to use the robust onboarding, training, knowledge transfer, and performance management systems that are in place, to ensure that turnover of all employees and IPAs have minimal impact on operations.
- Migrate Program Director and Executive IPAs to the USA Performance system for managing performance plans.

b) *IPAs can spend up to 50 days each year on Independent Research/Development (IR/D).*

- Continue to submit the IR/D Annual Report to the DADs, covering program participation statistics, average days and dollars requested and used and status of IR/D training and outreach.
- Continue to provide annual training for IR/D experts, including updates to the IR/D Guide and the online electronic IR/D plan.
- Continue to provide quarterly data to NSF senior managers to ensure appropriate oversight of IR/D time and travel by both permanent and rotating staff.
- Continue to perform yearly data checks to assure that there are no IPA IR/D participants where NSF payment of travel to their home institutions exceeds 12 trips per year.

c) *IPAs are not subject to Federal pay and benefits limits.*

- As of FY 2020, the gap in pay between IPAs and Federal employees has been reduced/eliminated by implementing the required 10% cost-share as policy. Thus, this does not constitute a significant risk to the agency. NSF will continue to monitor costs of the program, and provide annual reports to the Director, COO and NSF senior management.

[1] *https://www.opm.gov/policy-data-oversight/senior-executive-service/facts-figures/#url=Demographics*

MANAGEMENT CHALLENGE 4: Managing the Antarctic Infrastructure Modernization for Science (AIMS) Project

NSF Lead: William Easterling, Assistant Director, Directorate for Geosciences and Kelly Falkner, Director, Office of Polar Programs

Summary of OIG Identified Challenge

a) *The Antarctic Infrastructure Modernization for Science (AIMS) Project will stretch Agency resources and may present additional challenges for NSF to overcome.*
b) *In addition, OPP is also managing construction of the Information Technology & Communications (IT&C) primary facility – a key precursor to the success of AIMS.*

NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge

NSF—through the Office of Polar Programs (OPP) in the Directorate for Geosciences (GEO)—funds and manages the U.S. Antarctic Program (USAP). The USAP supports United States' research and national policy goals in the Antarctic. USAP has two major construction projects ongoing at McMurdo Station – the IT&C Primary Addition, which entails building onto an existing facility for the consolidation of IT&C functions, and the AIMS Project, for which 6 new facilities are being built to replace multiple outdated structures and consolidate key functions for more streamlined and efficient operations. Both projects are being implemented through NSF's Antarctic Support Contractor (ASC) under a FAR-based contract with NSF. Antarctica's remote location, extreme environment, and the short period of time during which the continent is accessible present challenges above and beyond those typically encountered for domestic construction projects.

The ASC (Leidos, Inc.) has a well-developed risk identification and mitigation process overseen by NSF as captured in the Project Execution Plan. The initial risk register for AIMS contained 120 entries to develop the project's budget contingency – key among them were delays in long-lead procurement items, inadequate quantities of fill material on-site, and work stoppages due to weather. Leidos mitigates the likelihood and impacts of these key risks through extensive pre-authorization planning and coordination to identify the key long-lead material and equipment purchases to support delivery dates meeting the logistics supply chain requirements. These procurements are captured and tracked in the project integrated master schedule and reviewed regularly by project and program leadership.

A significant challenge that remains is the risk of increased costs due to unpredictable and fluctuating market conditions. To minimize the impact of these uncertainties, each major construction package is awarded only after designs are complete, subcontractor bids are received, and costs are understood. This risk of rising costs has materialized in the first few construction packages, and mitigation steps have included evaluation of design-to-cost measures and seeking revised bids. Another significant challenge remaining is the need to align logistics

chain/cargo capacities with the planned pace of construction. To mitigate this risk, NSF and Leidos held a series of workshops to clearly define execution and oversight processes for each step in the logistics pathway.

The global pandemic associated with COVID-19, which is considered an unforeseen event not addressed by budget contingency for AIMS construction, has had impacts on the entirety of USAP operations. As a result of the significant health risk to the deployed population as well as global travel restrictions, it was necessary to make significant changes to program and construction project plans. The global pandemic resulted in "excusable delays" for the contractor as well as additional government-directed delays in performance of work under the AIMS project. This included placing the construction sites in a safe and stable configuration in March 2020 and bringing home deployed construction crews earlier than anticipated. In accordance with NSF policy, the magnitude of these impacts will require re-baselining of the AIMS project and OPP is actively engaged with Leidos, BFA, and the Office of the Director for that purpose.

NSF's Corrective Measures to Address the Challenge

Demonstrated Progress Through Actions Taken in Prior Fiscal Years

- Completed design and began construction on the IT&C Primary Addition Project. As of March 2020, the facility construction was 74% complete and is poised to be continued as conditions warrant. Significant delays to schedule due to the COVID-19 pandemic will now require a re-baselining effort.
- AIMS received authorization for the total project cost and duration from the National Science Board in February 2019 following extensive internal reviews and Independent Cost Estimate (ICE), with the first two construction packages awarded for the Vehicle Equipment and Operations Center and the Lodging Building exterior in April 2019.
- OPP augmented internal staffing for program/project management and oversight by assigning the management of capital projects to a dedicated staff resource.
- Shortly following AIMS authorization, weekly meetings of the core Integrated Project Team – including OPP, DACS, and LFO – were initiated.

Demonstrated Progress Through Actions Taken in FY 2020

- On-site work began on AIMS with aggregate production, and demolition of facilities in the footprint of VEOC and Lodging. As of March 2020, the project was approximately 16.5% complete. Significant delays to schedule due to the COVID-19 pandemic will now require a re-baselining effort.
- Continued to engage the research community to ensure they remained aware of potential disruptions that construction might have on Antarctic science.
- Partnered with BFA/DACS and LFO to identify areas the contractor needed to strengthen, which resulted in the contractor hiring additional staff, restructuring the office supporting the contract, and obtaining interagency support for cost analysis from the U.S. Army Corps of Engineers (USACE).
- Augmented the AIMS Integrated Project Team by adding a Project Controls Lead, providing support to the Program Officer.
- Restructured USACE support being provided to the AIMS project by moving from cost reasonableness reviews to full independent cost estimates for proposal packages.
- Completed verification and acceptance of the AIMS Earned Value Management System (EVMS) in accordance with NSF policy.
- Enlisted formal Value Engineering sessions with NSF participation.

- Increased financial oversight of Construction in Progress reporting and construction invoicing by requiring Program Officer review of every invoice, and augmenting the accounting support to OPP.

NSF's Anticipated Milestones in FY 2021

- Continue monitoring and oversight of the AIMS and IT&C Primary Addition Projects in accordance with established Internal Management and Project Execution Plans including external panel reviews and EVMS surveillance reviews for AIMS. Significant delays to schedule due to the COVID-19 pandemic will now require a re-baselining effort for both projects.
- Assess COVID-19 impacts and evaluate options for minimizing negative impacts to AIMS cost and schedule.
- Working closely with BFA, re-baseline AIMS, subject the revised cost, scope and schedule to external panel review, Facilities Readiness Panel Review, Director's Review Board Review and NSB re-authorization of the Total Project Cost.

MANAGEMENT CHALLENGE 5: Encouraging the Responsible and Ethical Conduct of Research

NSF Lead: Fleming Crim, Chief Operating Officer

Summary of OIG Identified Challenge

a) *Develop written guidelines or templates for universities to follow so that NSF can ensure the training is of sufficient quality and complies with Responsible Conduct of Research (RCR) training requirements. Strengthen the impact of RCR training by working with the National Institutes of Health to harmonize RCR expectations as much as possible.*

b) *Ensure that reports of sexual and other forms of harassment made pursuant to NSF's award term and condition are properly made to the NSF Office of Diversity and Inclusion and that NSF has enough staff and resources to respond to this new body of work.*

NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge

Research supported by NSF must be conducted responsibly and ethically to ensure that it is credible to the science and engineering community, trusted by the public, and maximizes the Nation's return on investment. NSF views the Responsible and Ethical Conduct of Research (RECR) holistically—not only as a responsibility to generate and disseminate knowledge with rigor and integrity, but also as a responsibility to conduct peer review with the highest ethical standards; diligently protect proprietary information and intellectual property from inappropriate disclosure; and treat students and colleagues fairly and with respect. This expectation is fully articulated in the June 2020 update to the Proposal and Awards Policies and Procedures Guide (PAPPG) and on NSF's updated RECR web page.

NSF does not tolerate research misconduct (falsification, fabrication, and plagiarism) in proposing or performing research funded by NSF, in reviewing research proposals submitted to NSF, or in reporting research results

funded by NSF. Allegations of research misconduct (RM) are taken seriously and are investigated by NSF's OIG. The OIG refers completed investigations of RM to NSF for action. Upon determination of RM, NSF promptly takes appropriate action against individuals or organizations.

NSF is working to understand and reduce the occurrence of irresponsible and unethical research conduct through three sets of actions: 1) characterizing the problem and identifying priorities through stakeholder engagement, complemented by data collection and analysis; 2) funding basic research into the underlying causes and potential solutions, including the effectiveness of different approaches to improve RECR; and 3) implementing change through policy and public engagement. As reported by the OIG in its Fall 2019 Semiannual Report, the number of RM referrals to NSF from FY 2010 to FY 2019 has remained relatively low and has not trended upward. For example, from FY 2016 to FY 2019 NSF reviewed over 187,000 proposals, resulting in approximately 46,000 awards; *during that same four-year period, the OIG issued nearly four dozen referrals to NSF for RM (excluding other types of investigative referrals). Nearly half were allegations of research misconduct in proposals that NSF had not funded. Note that the referrals of potential RM account for just 0.02% of the proposals received.*

NSF is supporting research into the underlying causes, effective training practices, and how to best disseminate knowledge and best practice through community-led approaches. This approach will enhance understanding of the scope, causes, and best mitigation strategies to reduce detrimental conduct. NSF welcomes any further insight from the OIG into the scope and nature of RECR problems (including RM) brought to their attention. NSF is also involved in efforts to harmonize RECR expectations with other agencies, including the National Institutes of Health (NIH), being led by the Office of Science and Technology Policy (OSTP) through the National Science and Technology Council (NSTC) Joint Committee on Research Environment (JCORE). JCORE is co-chaired by the NSF Director, and NSF staff co-chair all four of the subcommittees: Coordinating Administrative Requirements for Research; Rigor and Integrity in Research; Research Security; and Safe and Inclusive Research Environments. Furthermore, NSF leadership has committed to ensuring that the award term and condition (T&C) associated with sexual and other forms of harassment reporting is managed effectively, dedicating professional staff and senior executives in the Office of the Director to respond to and assess the reporting processes and outcomes.

NSF's Corrective Measures to Address the Challenge

NSF has consistently addressed RECR by working to characterize the problem and identify priority actions; funding basic research into the underlying causes and potential solutions; and implementing change through policy and public engagement.

Demonstrated Progress Through Actions Taken in Prior Fiscal Years (FY 2019)

Characterizing the problem and identifying priority actions:

- Funded the Online Ethics Center to hold a national workshop on identifying promising practices and innovative programs in RECR education and practice.
- Issued a Dear Colleague Letter welcoming proposals in Education and Human Resources (EHR) on equity, inclusion, and ethics in Science, Technology, Engineering and Mathematics (STEM).
- Issued a Dear Colleague Letter encouraging researchers in computer and information science and engineering to include fairness, ethics, accountability, and transparency in their proposals.
- Renewed and refreshed the mission of the Online Ethics Center to develop communities of practices in RECR education (continuing into FY 2020).

Implementing change through policy and public engagement:

- Provided intramural and extramural guidance, resources, and consultation for the inclusion of ethics considerations in citizen science, collaborative/team science, and international science by NSF program officers overseeing the Ethics and Responsible Research Program (continuing into FY 2020).
- Conducted outreach to the Principal Investigator and awardee community on promising practices in RECR training; continued to encourage STEM faculty to incorporate RECR into their mentoring, teaching, and curriculum development (continuing into FY 2020).
- Presented guidance and NSF perspectives to university research integrity officers and other research administrators at a workshop on RECR tools and methods for university leaders.
- Expanded efforts to create a harassment-free environment internally at NSF, including requiring mandatory training in harassment prevention for all personnel, which includes Federal employees; Intergovernmental Personnel Act (IPA) assignees; Visiting Scientists, Engineers and Educators; in-house fellows; experts; and others who regularly conduct business at NSF. (See Staff Memorandum OD 19-09, Required Harassment Prevention Training.
- Clarified the PAPPG requirements for anti-harassment mitigation in conference/workshop proposals.
- Funded an Online Ethics Center workshop on training STEM faculty new to teaching ethics using a "train the trainer" approach for capacity building across diverse STEM communities (continuing into FY 2020).
- Published, communicated, and implemented NSF's new harassment policy.
- Added staff in the Office of Diversity and Inclusion to manage the harassment T&C process.
- Added additional questions and answers to further explain the new harassment policy in the updated T&C FAQs.
- Drafted language on the applicability of the new T&C for awards made directly to individuals (vs. institutions); e.g., for NSF Postdoctoral Fellowships.

Demonstrated Progress Through Actions Taken in FY 2020

Characterizing the problem and identifying priority actions:

- Collected stakeholder input through regular participation in the annual meetings of the Association for Practical and Professional Ethics.
- The Social, Behavioral & Economic Sciences (SBE) Directorate asked leading members from the Association for Practical and Professional Ethics to join SBE's Professional Societies Advisory Board and SBE's Committee of Visitors to provide direct stakeholder input into the Ethical and Responsible Research Program.
- OD and SBE staff members regularly discussed policy and best practices with colleagues in the HHS Office of Research Integrity.

Funding basic research into the underlying causes and potential solutions:

- Repositioned the former Cultivating Cultures for Ethical STEM program to SBE's Office for Multidisciplinary Activities and renamed to Ethical and Responsible Research to fund research projects that identify factors that are effective in the formation of ethical STEM researchers and approaches to developing those factors in all STEM fields that NSF supports. Increased the budget of this program from $3.55 million to $5.55 million.
- Renewed and refreshed the mission of the Online Ethics Center to develop communities of practices in RECR education.

Implementing change through policy and public engagement:

- Provided intramural and extramural guidance, resources, and consultation for the inclusion of ethics considerations in citizen science, collaborative/team science, and international science by NSF program officers overseeing the Ethics and Responsible Research Program.
- Conducted outreach to the principal investigator and awardee community on promising practices in RECR training; continued to encourage STEM faculty to incorporate RECR into their mentoring, teaching, and curriculum development.
- Funded an Online Ethics Center workshop on training STEM faculty new to teaching ethics using a "train the trainer" approach for capacity building across diverse STEM communities.
- Provided a comprehensive definition of RECR in the 2020 PAPPG: "The responsible and ethical conduct of research involves not only a responsibility to generate and disseminate knowledge with rigor and integrity, but also a responsibility to (a) conduct peer review with the highest ethical standards, (b) diligently protect proprietary information and intellectual property from inappropriate disclosure, and (c) treat students and colleagues fairly and with respect."
- Published revisions to the PAPPG to point to promising practices in RECR training, including the encouragement of faculty training and reference material to use in designing RECR training (National Academy of Sciences, Engineering, and Medicine (NASEM) Reports: Fostering Integrity in Research; Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine; and Reproducibility and Replicability in Science).
- Issued in the 2020 PAPPG clarification of requirements for disclosure of institutional/professional appointments to achieve full transparency.
- Created a "Speak Up" campaign to raise awareness of materials and resources available for personnel to address discrimination, bullying, harassment, stress and anxiety, physical safety, and violence in the workplace.
- ODI, in collaboration with OIA's evaluation and assessment team, developed a phased evaluation plan for the new T&C on reporting incidents of harassment, with the first stage starting in FY 2021.

NSF's Anticipated Action Plan Milestones

As NSF continues to characterize the problem and identify priority actions, fund basic research, and implement change through policy and public engagement, specific actions are planned for the coming year.

Strengthen the understanding and effectiveness of RECR training and community guidance through coordination with Federal agencies and the ethics community:

- Leverage NSF's leadership role as co-chair of the JCORE Safe and Inclusive Research Environment subcommittee and the JCORE Rigor and Integrity in Research subcommittee to promote the coordination and development of RECR among Federal agencies, including with NIH.
- Fund through the Ethical and Responsible Research program a prospective workshop that will curate relevant ethics and educational resources for NSF's RECR training requirements.
- Update NSF's RECR page periodically to ensure the newest resources and current information are available; build a more user-friendly portal for the new web site (see https://beta.nsf.gov/) that makes it easier to find available resources and makes NSF's commitment to RECR more prominent.

Assess and strengthen through action and policy efforts to reduce sexual and other forms of harassment:

- Implement Recommendation 15 from the GAO report, Sexual Harassment in STEM Research, that the "Director of NSF should establish goals and an overall plan to assess all of the agency's sexual harassment prevention efforts for their university grantees, including methods to regularly monitor and evaluate Its sexual harassment prevention policies and communications mechanisms."
- Collaborate with other Federal agencies to address harassment in a coordinated manner through active participation in the JCORE Safe and Inclusive Research Environment subcommittee and its ad hoc working groups.

MANAGEMENT CHALLENGE 6: Mitigating Threats Posed by Foreign Government Talent Recruitment Programs

NSF Lead: Rebecca Keiser, Chief of Research Security Strategy and Policy

Summary of OIG Identified Challenge

Foreign government talent recruitment programs – designed to benefit the foreign state by obtaining information and technology from abroad – have the potential to exploit the openness of American universities and threaten the integrity of U.S. research initiatives. Talent recruitment programs target individuals with expertise in cutting-edge science, including NSF-funded researchers, merit review panelists, and career Federal employees or rotators who manage NSF's scientific programs. These programs may require members to provide proprietary or export-controlled information and create conflicts of interests. Failure to disclose membership in such programs can have criminal or civil ramifications.

NSF should continue to assess and refine its controls in this area and should work to ensure that it has sufficient staff and resources to respond to this challenge.

NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge

The National Science Foundation seeks to maintain a vibrant science and engineering community for the benefit of the Nation. Participation in this community relies on individuals to uphold core principles and values such as openness, transparency, collaboration, and integrity. However, open scientific exchange and research face a challenge from some foreign governments through the use of talent recruitment programs. Some of these programs deliberately disregard these core principles and incentivize participants to acquire U.S. funded scientific research. These programs target scientists, engineers, and educators of all nationalities working or educated in the United States.

Over the past two years, NSF has taken steps to mitigate threats posed by foreign government talent recruitment programs. To ensure that NSF has sufficient staff and resources to continue to respond to this challenge, NSF created and filled the position of Chief of Research Security Strategy and Policy in March 2020 and is developing a new team to support the Chief. In addition, NSF coordinated with other agencies via the Joint Committee on the Research Environment (JCORE), an activity launched by the White House Office of Science and Technology Policy (OSTP) under the National Science and Technology Council in mid-2019.

Under the leadership of OSTP and through the JCORE subcommittee on research security which NSF co-chairs, U.S. science funding agencies are taking a risk-based approach to strike an appropriate balance between fostering the open and internationally collaborative environment that has contributed to the success of the U.S. research enterprise and mitigating emerging threats to the integrity of that enterprise. NSF also co-chairs a JCORE subcommittee on coordinating administrative requirements for research across the science funding agencies, including those associated with research security. We work closely with other U.S. government science agencies to share policies and practices, and regularly engage with the academic research community to educate them about the risks, hear their concerns about this emerging challenge, and clarify our positions, policies, and procedures. With an increased awareness of the risk, the U.S. research community now is better positioned to understand, evaluate, and do their part to address it.

NSF's Corrective Measures to Address the Challenge

Demonstrated Progress Through Agency Actions Taken in Prior Fiscal Years

In July 2019, NSF released a Dear Colleague Letter (DCL) on Research Protection to the research community from former Director Córdova. The DCL alerted the community to existing and emerging risks to the global research ecosystem, inspired conversations about balancing science and security, and warned of the risks of participation in foreign government talent recruitment programs. Further, it described NSF's commitment to vigilantly addressing emerging risks to the Nation's science and engineering enterprise, including concrete steps the agency is taking. To amplify the message from Director Córdova, NSF conducted outreach to multiple research community groups and sought best practices from the JASON advisory group, the National Science Board, and NSF Advisory Committees.

At the same time, NSF issued a policy prohibiting NSF personnel and rotators such as Intergovernmental Personnel Act personnel (IPAs) detailed to NSF from participating in foreign government talent recruitment programs. This policy helps prevent inappropriate foreign influence on NSF personnel. This change built on earlier steps to protect NSF's policies, programs, and priorities, including the merit review process. For example, in 2018, NSF issued a requirement that all staff employed by NSF or detailed to NSF must be U.S. citizens or have applied for U.S. citizenship. In addition, earlier in 2019, NSF issued a note to NSF staff reminding everyone that government ethics regulations require accurate and timely financial disclosure reports and that federal ethics rules apply to both our career and rotator personnel.

NSF's actions were taken in coordination with other U.S. agencies that fund basic research, including through the White House National Science and Technology Committee's JCORE subcommittees on research security and coordinating administrative requirements for research.

Demonstrated Progress Through Agency Actions Taken in FY 2020

- **Improved transparency / clarification for disclosure:** In January 2020, following a public comment process that began in May 2019, NSF issued clarifications to its proposal preparation requirements specified in the PAPPG to ensure senior personnel on proposals provide information on all sources of current and pending research support, foreign and domestic. NSF has also clarified its biographical sketch preparation requirements to ensure that any titled position is identified whether or not remuneration is received. Effective June 1, 2020, all senior personnel identified on an NSF proposal are required to comply with these requirements.

- **Standardized format and streamlined processes for disclosure:** As part of its revision to the PAPPG, NSF announced that use of an NSF-approved format will be required to be used by senior personnel in preparation of both the biographical sketch and current and pending support sections of the proposal. To streamline the process, NSF worked with the National Institutes of Health (NIH) to use SciENcv: Science Experts Network Curriculum Vitae as an NSF-approved format for both sections of the proposal. The formats were released in April 2020, and the community will be required to use an NSF-approved format to prepare these sections of any proposal submitted or due on or after October 5, 2020.
- **Issuance of a new award term and condition regarding previously undisclosed information:** NSF's longstanding policy is that senior personnel must disclose, in any submitted proposal, all current and pending support. In July 2020, NSF released a revised set of general terms and conditions that incorporated a new term that addresses the process and content requirements to be used if an organization discovers that a Principal Investigator or co-Principal Investigator on an active NSF award failed to disclose current support or in-kind contribution information as part of the proposal submission process. This new term and condition is effective for all new awards and funding amendments on existing awards effective October 5, 2020.
- **Term and condition for foreign collaboration considerations in major facilities:** In July 2020, NSF finalized a revised term and condition on foreign collaboration considerations for major facilities. The new term and condition is effective October 5, 2020, for new awards and funding amendments on existing awards. As of October 5, 2020, awards that contain the revised term and condition must provide NSF with advance notification of potential collaboration with non-U.S. organizations or governments in connection with its NSF-funded award and must await guidance from NSF prior to negotiating terms of any potential agreement.
- **Training for NSF staff:** In March 2020, NSF released mandatory training for all NSF personnel on science and security. It includes modules on risks from foreign governments, NSF's policies on disclosure, and NSF's policies on staff participation in foreign government talent recruitment programs.
- **Independent report on research security:** In December 2019, NSF accepted the final commissioned report from the independent JASON advisory group assessing risks to fundamental research. The study included recommendations for NSF and grantee institutions to maintain balance between openness and security of science. In March 2020, NSF published its response, agreeing with the report's recommendations and noting where the agency has already taken action or plans to do so. More details on NSF's actions are included elsewhere in this document, and briefly, they can be summarized in relation to the nine JASON recommendations:
    1. **Scope of disclosure:** NSF clarified its disclosure requirements in the revision to the PAPPG. NSF's new internal training reinforces these requirements. (see above)
    2. **Failures to disclose:** NSF developed a new term and condition for previously undisclosed information. (see above)
    3. **Responsibilities of all stakeholders and harmonization:**
        - NSF has conducted significant outreach with other federal agencies, Congress, the research community, and the OIG (as detailed in subsequent sections).
        - NSF has been in discussions with the NIH to examine the existing content disclosure requirements for both the biographical sketch and current and pending support by both agencies. The goal of this exercise is to harmonize, to the extent possible, the requirements imposed by both agencies.

- Through JCORE, NSF has worked to harmonize definitions of terms such as conflicts of commitment.

4. **Tools to evaluate risk:** Through JCORE, the U.S. government collected best practices in risk assessment and mitigation from the research community, from other agencies, and from the intelligence community. Internally, NSF has used an Enterprise Risk Management framework to identify and mitigate risks.
5. **Expand ethics training:** NSF has reviewed its internal training modules to adapt them for potential external use.
6. **Reaffirm the principles of NSDD-189:** NSF continues to support openness and transparency in fundamental research. In 2018, in its Statement on Security and Science (NSB-2018-42), the National Science Board "strongly reaffirm(ed) the principle behind President Reagan's National Security Decision Directive 189 (NSDD-189)."
7. **Communicate the problem and the importance of foreign researchers and collaborations:** NSF agreed with the JASON Advisory Group on the need for an evidence-based description of the scale and scope of the problems, though as many potential conflicts are not disclosed, understanding the full scale and scope is a great challenge. NSF has and will continue to communicate to other government agencies that international collaboration and participation are essential to our continued scientific advancement.
8. **Engage with foreign researchers in the United States:** NSF has engaged with the full community of researchers, both foreign and domestic, in the United States (see "Engagement with the Research Community" below).
9. **Plan for maintaining competitiveness for top talent globally:** NSF's specialized focus on STEM education, with a more than $900 million budget, has programs that concentrate on maintaining the excellence of the U.S. STEM educational system.

- **Leadership in the U.S. government:** As co-chair of the JCORE subcommittee on research protection, NSF coordinated policy, practices, and guidance on science and security with the White House, other science agencies, and the intelligence and law enforcement communities. JCORE developed education and outreach materials – including a slide deck released in June 2020 called Enhancing the Security and Integrity of America's Research Enterprise – that highlight examples of risks to research and outline actions the Federal government is taking to protect America's research enterprise.
- **Engagement with Congress:** In November 2019, the Head of NSF's Office of International Science and Engineering, testified before the Permanent Subcommittee on Investigations of the Senate Committee on Homeland Security and Governmental Affairs. The briefing focused on NSF's efforts to implement all reasonable and necessary steps to ensure the integrity of federally-funded research and protect against threats from foreign government talent recruitment programs. In March 2020, a similar briefing was provided to the House Committee on Science, Space, and Technology.
- **Engagement with the research community:** To increase awareness of the risks and compliance with NSF's policies and procedures, NSF met with or presented to the research community, including to the National Science Board, Association of American Universities, Association of Public and Land-grant Universities, American Association of the Advancement of Science Board of Directors, Council on Government Relations, NSF Advisory Committees, American Physics Society, International Union of Pure and Applied Physics, American Society for Engineering Education, Federal Demonstration Partnership, and National Academies of Science, Engineering, and Medicine's Committee on Science, Engineering, Medicine, and Public Policy. NSF's outreach included an articulation of the clarified requirements for

both the biographical sketch and current and pending support sections of the proposal. This outreach helped NSF to develop, issue, and update a set of Frequently Asked Questions to help ensure a consistent understanding on NSF expectations.

- **Engagement with the Office of Inspector General:** In 2020, NSF worked collaboratively with the OIG, where appropriate, to address threats posed by foreign government talent recruitment programs. In 2020, consistent with our OIG Cooperation Directive, NSF continued to support the OIG's investigations, including those involving allegations related to foreign talent programs. Our support includes taking appropriate actions such as suspending or terminating awards, based on OIG recommendations arising from, for example, investigations for failures to disclose foreign talent program affiliations.
- **Risk-benefit assessments:** Consistent with OSTP's guidance to utilize a risk-based approach to balance the need to foster an open and internationally collaborative environment while mitigating threats to the integrity of that enterprise, NSF worked with experts in Enterprise Risk Management to conduct risk assessments and analyses to guide decision-making. This includes assessing and refining NSF's controls to mitigate threats posed by foreign government talent recruitment programs. NSF also developed and implemented a formal process to assess requests for collaborative agreements with foreign entities that may involve items of value provided to or from NSF-funded major research facilities.
- **Creation of the position of Chief of Research Security Strategy and Policy:** In March 2020, NSF created and filled the position of Chief of Research Security Strategy and Policy (CRSSP) and established a Research Security Strategy and Policy Group. The CRSSP is the NSF focal point for providing science and security strategy and policy recommendations to NSF leadership and for ensuring that NSF has the information that it needs to act vigilantly to address existing and emerging risks to the Nation's science and engineering enterprise posed by foreign government talent recruitment programs.

NSF's Anticipated Action Plan Milestones

NSF management developed the anticipated milestones below in consideration of NSF's strategic and operational objectives, the risks inherent to achieving these objectives, and the key actions NSF has already taken in response to those risks.

- Continue to serve as co-chair of the JCORE subcommittees on research security and reducing administrative workload and work closely with the White House, other federal science funding agencies, and intelligence and law enforcement communities to share information, promote outreach, coordinate policy and practices, and develop guidance for federal departments and agencies, as well as for universities and other research institutions.
- Facilitate NSF's access to classified information and ability to engage in classified discussions with other U.S. government agencies more easily, including through the addition of a Sensitive Compartmented Information Facility (SCIF) in NSF's headquarters.
- Evaluate recommendations and consider implementing additional policy steps or outreach related to research security at both the agency level and the JCORE level. Additional activities could include, but are not limited to:
    1. **Scope of disclosure:** Require the use of an NSF-approved format for biographical sketches and current and pending support in proposals submitted or due on or after October 5, 2020.
    2. **Failures to disclose:** Continue to coordinate with the NSF OIG and take the appropriate action needed to address violations.

3. **Responsibilities of all stakeholders and harmonization:** Harmonize requirements and systems with other U.S. science funding agencies, when practical; co-chair the JCORE subcommittee on coordinating administrative requirements for research.
4. **Tools to evaluate risk:** Continue to use the Enterprise Risk Management framework to describe science and security risks and implement risk mitigation strategies; initiate the development of risk assessment tools; and carry out regular risk assessments regarding the impacts of NSF's response to the threats posed by foreign government talent recruitment programs. Develop an approach to promulgate best practices in the research community.
5. **Expand ethics training:** Prepare and distribute communication and briefing material for the external scientific research community on science and security and research integrity.
6. **Reaffirm the principles of NSDD-189:** Work with other U.S. government agencies to further reaffirm the National Policy on the Transfer of Scientific, Technical and Engineering Information (aka NSDD-189) and maintain the distinction between research that should continue to be made open to the scientific community and research that should be protected due to security concerns.
7. **Communicate the problem and the importance of foreign researchers and collaborations:** Support efforts of JCORE, the intelligence community, and/or law enforcement to understand the scale and scope of the risk of inappropriate foreign influence on the U.S. science and engineering research ecosystem, recognizing that this is a great challenge.
8. **Engage with foreign researchers in the United States:** Further engage with the full community of researchers, both foreign and domestic.
9. **Plan for maintaining competitiveness for top talent globally:** Continue to support programs that will increase the pool of top science and engineering talent available in the United States.

PAYMENT INTEGRITY INFORMATION ACT REPORTING

The Improper Payments Information Act of 2002 (IPIA; Pub. L. 107-300), as amended by the Improper Payments Elimination and Recovery Act of 2010 (IPERA; Pub. L. 111-204), the Improper Payments Elimination and Recovery Improvement Act of 2012 (IPERIA; Pub. L. 112-248), and the Payment Integrity Information Act of 2019 (PIIA; Pub. L. 116-117) require agencies to annually report information on improper payments to the President and Congress. More detailed information on improper payments and all of the information previously reported in the AFR that is not included in this FY 2020 AFR can be found at https://paymentaccuracy.gov/.

Actions Taken to Address Auditor Recovery Recommendations

Using OMB Circular A-123, Appendix C, Part III.C.6 guidance, NSF determined, that it would not be cost effective to conduct recapture audits of its single grants program and other activities (contracts, charge cards, and payments to employees). OMB agreed with NSF's analysis. As such, NSF did not conduct payment recapture audits during FY 2020.

NSF has leveraged the results of the work performed under IPERA, audits, grant monitoring programs, and internal control reviews. All consistently demonstrated that there is not a significant risk of unallowable costs or improper payments within NSF's single grant program and other mission support activities. No circumstances have changed within NSF's grant program or its mission support activities requiring NSF to reassess its payment recapture cost-effectiveness analysis.

Fraud Reduction Report

The Fraud Reduction and Data Analytics Act (FRDAA) of 2015, Pub. L. 114-186, requires agencies to improve federal agency financial and administrative controls and procedures to assess and mitigate fraud risks, and to improve federal agencies' development and use of data analytics for the purpose of identifying, preventing, and responding to fraud, including improper payments.

In FY 2020, NSF incorporated fraud risk into its analytics and control activities to proactively mitigate and monitor potential fraud scenarios. NSF implemented a fraud risk-based approach in the following areas:

- *Improper Payments Predictive Modeling*: NSF developed a prototype risk model that uses Single Audit data to provide a quantitative view of which NSF awardees may present relatively higher risk of improper payments on a go-forward basis and in light of the evolving risk in the COVID-19 environment. This will help the agency address improper payments risk, including fraud risk, with targeted monitoring.
- *Travel Card Misuse Monitoring*: NSF increased the efficiency of its travel card monitoring process by automating key portions of the monthly travel card misuse review. The team also developed a Travel Card Misuse Dashboard to increase transparency into potential misuse, including fraud, and associated follow-up activities. The dashboard also provides a stronger overarching perspective of travel activity across NSF, enabling users to derive new insights into financial trends or potential areas of interest with the travel card program.
- *Enhanced Risk and Control Checkpoints*: As part of an enhanced risk and control checkpoint in September 2020, NSF assessed its risk and control landscape to identify areas of potential elevated risks associated with COVID-19, including the risk of fraudulent activities by internal and external parties. NSF reviewed the elevated risk areas with process owners and updated levels of

risk and control activities to stay abreast of key monitoring activities and changes to fraud indicators.

In FY 2021, NSF will continue to identify and monitor fraud risks, as well as key data and information that can be leveraged to improve controls and monitoring activities. As the agency's data analytics program continues to mature, NSF will look for additional opportunities to introduce advanced tools and techniques to support fraud risk identification and monitoring.

REAL PROPERTY

NSF's headquarters, in Alexandria, Virginia, is leased by the General Services Administration (GSA). The move to the new headquarters was completed in FY 2018, and NSF's occupancy agreement is through FY 2032.

Real property metrics for NSF and other federal agencies are available at the FY 2019 Reduce the Footprint results link: https://www.performance.gov/real-property-metrics/.

CIVIL MONETARY PENALTY ADJUSTMENT FOR INFLATION

The Federal Civil Penalties Inflation Adjustment Act Improvements Act of 2015 (the 2015 Act; Sec. 701 of Public Law [P.L.] 114–74) further amended the Federal Civil Penalties Inflation Adjustment Act of 1990 (P.L. 104–410) to improve the effectiveness of civil monetary penalties and to maintain their deterrent effect. The 2015 Act requires agencies to (1) adjust the level of civil monetary penalties with an initial "catch-up" adjustment through an interim final rulemaking and (2) make subsequent annual adjustments for inflation. Inflation adjustments are to be based on the percent change in the Consumer Price Index for all Urban Consumers (CPI-U) for the month of October preceding the date of the adjustment, relative to the October CPI-U in the year of the previous adjustment.

The only civil monetary penalties within NSF's jurisdiction are those authorized by the Antarctic Conservation Act of 1978, 16 U.S.C. 2401, et seq., and the Program Fraud Civil Remedies Act of 1986, 31 U.S.C. 3801, et seq.

The following table identifies NSF's FY 2020 inflation adjustments to civil monetary penalties.

Table 3.3 – FY 2020 Civil Monetary Penalty Adjustment for Inflation

Statutory Authority	Penalty (Name and Description)	Year Enacted	Latest Year of Adjustment (via Statute or Regulation)	Current Penalty Level ($ Amount or Range)	Location for Penalty Update Details
Antarctic Conservation Act of 1978, 16 U.S.C., 2401 *et seq.,* as amended	Antarctic Conservation Act, Knowing violations	1978	2020	$29,755	85 FR 1825 Friday, January 10, 2020
Antarctic Conservation Act of 1978, 16 U.S.C., 2401 *et seq.,* as amended	Antarctic Conservation Act, Not knowing violations	1978	2020	$17,583	85 FR 1825 Friday, January 10, 2020
Program Fraud Civil Remedies Act of 1986, 31 U.S.C., 3801, *et seq.*	Program Fraud violations	1986	2020	$11,665	85 FR 1825 Friday, January 10, 2020

GRANTS PROGRAM REPORTING

Expired Awards Not Closed

OMB's Circular A-136, Financial Reporting Requirements requires agencies with Federal grants programs to submit a high-level summary of expired, but not closed, Federal grants and cooperative agreements (awards). Table 3.4, below, shows the total number of awards and balances for which closeout has not yet occurred, but for which the period of performance has elapsed by two years or more prior to September 30, 2020.

Table 3.4 – Age and Balances for Expired Awards not Closed

CATEGORY	2 – 3 Years	>3-5 years	>5 years
Number of Grants/ Cooperative Agreements With Zero Dollar Balances	224	288	279
Number of Grants/ Cooperative Agreements With Undisbursed Balances	30	31	-
Total Amount of Undisbursed Balances	$1.6 million	$1.7 million	-

Information shown above is as of 9/30/2020.

Of the 852 financial assistance awards (grants, cooperative agreements, and fellowships) that are expired but not closed, 61 have undisbursed balances; these balances total $3.3 million. Most of these 61 awards are to SBIR/STTR awardees or individual fellowship recipients. NSF plans to address the closeout of these awards in planned updates to our operating policies and procedures for automatic financial closeout of awards.

NSF works to close out all awards as quickly as possible. Typically, awards are financially closed 120-days after the end-date of the award and are administratively closed automatically once the awards are financially closed. The majority of the awards that are still not fully closed on this report have overdue final project reports and/or project outcome reports. While NSF has already incorporated many policies and procedures to track and enforce the submission of required project reports, NSF plans to review our current process and tighten our controls. These changes include reporting overdue report information to the Federal Awardee Performance and Integrity Information System, as prescribed in the revised 2 CFR § 200 published in the Federal Register on August 13, 2020,[1] among other possible changes.

[1] https://www.federalregister.gov/documents/2020/08/13/2020-17468/guidance-for-grants-and-agreements

UNDISBURSED BALANCES IN EXPIRED GRANT ACCOUNTS

In FY 2020, NSF funded research and education in science and engineering through grants and cooperative agreements to 1,900 colleges, universities, and other institutions. NSF grants are funded in one of two ways: (1) the grant may be funded fully at the time of award, called a standard grant, or (2) the grant may be funded incrementally (one year at a time), called a continuing grant. In both cases, all costs on the grant must be incurred by the grantee during the term of the grant period. At NSF, grantees typically have 120 days after the grant expires to complete final drawdowns and expenditures.

The information provided here pertains to the agency's two grant making appropriation accounts: Research and Related Activities and Education and Human Resources. The data reported are based on the following definitions:

- An **expired grant** is a grant award that has reached the grant end date and is eligible for closeout. For NSF, this means grants with an expired period of performance.
- **Undisbursed balances** on expired grants are amounts that remain available for expenditure before it is closed out.

Once a grant has expired, NSF takes actions to close out the grant both administratively and financially. The financial closeout action takes place 120 days after the award expiration date when the undisbursed balances are de-obligated from the award. Administrative closeout is initiated after financial closeout is completed.

The methodology used to develop undisbursed balances on expired grant awards is consistent with the U.S. Government Accountability Office (GAO) conclusions documented in their April 2012 report, GAO-12-360, *Grants Management: Action Needed to Improve the Timeliness of Grant Closeouts by Federal Agencies,* along with discussion and clarifying information from GAO. The data reported here reflects the amount of undisbursed balances in grant accounts that have reached their end date and are eligible for closeout and is provided in accordance with OMB M-16-18, *Financial and Performance Reporting on Undisbursed Balances in Expired Grant Accounts*.

1. **In the preceding three fiscal years, the total number of expired grant accounts with undisbursed balances (on the first day for each fiscal year) and the total amount that has not been obligated to specific grant or project remaining in the accounts**
   The number of expired grants with undisbursed balances for the preceding three fiscal years is provided in Table 3.5. The numbers and balances reflect a point in time before expired awards are closed out during normal processes described above. For FY 2020, there were 4,478 expired grants with undisbursed balances of $84,615,563.

Table 3.5 – Status of Undisbursed Balances in Expired Grants

	FY 2020 (as of 9/30/20)	FY 2019 (as of 9/30/19)	FY 2018 (as of 9/30/18)
Number of expired grants	4,478	5,204	5,225
Undisbursed balances prior to closeout	$84,615,563	$97,666,016	$107,860,158

2. Details on future action NSF will take to resolve undisbursed balances in expired grant accounts

NSF continually monitors its grant awards throughout their lifecycle following a comprehensive post-award monitoring process. NSF grants are closed based on their period of performance end date. All unliquidated (or undisbursed) award balances are de-obligated 120 days after the grant period has expired. Having small undisbursed balances at the end of the grant period is a routine occurrence, as not all grantees fully spend the funds obligated during the course of their research.

3. The method that NSF uses to track undisbursed balances in expired grant accounts

NSF completes financial closeout of expired grant awards on a daily basis using a set of automated and manual activities. Eligibility for closeout for all NSF awards begins 120 days after the award expiration date. The NSF closeout process automatically de-obligates any unliquidated award balance, produces an award closeout transaction to flag the award as financially closed, and sends the financial closeout date to NSF's award management system. This initiates final administrative closeout procedures in the award management system.

The expected award closeout date is made available to awardees and staff through the Award Cash Management Service (ACM$). ACM$ requires the submission of award level payment amounts and expenditures each time funds are requested by awardees and allows NSF to complete post-award monitoring at the individual award level throughout the lifecycle of the award.

4. Process for identification of undisbursed balances in expired grant accounts that may be returned to the Treasury of the United States

When a grant is closed out, the unliquidated balances are de-obligated. The de-obligated grant balances are treated one of three ways:

- If the source appropriation is still active, the balances are recovered by NSF and remain available for valid new obligations until the source appropriation's expiration date.
- If the source appropriation has expired but funds have not yet been canceled, the grant balances are recovered by NSF and remain available for upward adjustments on other existing obligations within the source appropriation.
- If the source appropriation has been canceled, the grant balances are returned to the Treasury.

Prior to September 30 of each year, all undisbursed grant balances in canceling appropriations are de-obligated and subsequently returned to Treasury.

AWARDS TO AFFILIATED INSTITUTIONS

The following table lists institutions affiliated with members of the National Science Board (NSB) in FY 2020.[2]

Affiliated Institution	Awards Obligated in FY 2020 (Dollars in thousands)
Arizona State University	$65,312
California Institute of Technology	81,297
Catholic University of America	1,262
Massachusetts Institute of Technology	95,471
Michigan State University	83,720
Southwest Research Institute	374
Stanford University	93,747
University of Colorado	119,235
University of Florida	49,691
University of Massachusetts	58,878
University of Oregon	20,524
University of Tennessee	28,255
University of Texas at El Paso	17,331
University of the District of Columbia	1,760
University of Utah	43,480
University of Vermont	12,944
Washington University	20,447
TOTAL	***$ 793,728***

[2] This information is provided solely in the interest of openness and transparency. The table lists the dollar value of the awards made to institutions affiliated with NSB members during their time on the NSB in fiscal year ended September 30, 2020. NSB establishes the policies of NSF within the framework of applicable national policies set forth by the President and Congress. Federal conflict of interest rules prohibit NSB members from participating in matters where they have a conflict of interest or there is an impartiality concern without prior authorization from the designated agency Ethics Official. Individual NSF grant awards are made pursuant to a peer-review based process and most are not reviewed by the NSB. With regard to matters that are brought to the Board, NSB members are not involved in the review or approval of grant awards to their affiliated institutions. The table displaying Awards to Affiliated Institutions applicable to the previous fiscal year is available in the Appendices at https://nsf.gov/pubs/2020/nsf20002/pdf/nsf20002.pdf. Because of the regular turnover among NSB membership, the information in these tables is not directly comparable across years.

AWARDS TO ASSISTANT DIRECTOR IPAS' HOME INSTITUTIONS BY NSF DIRECTORATES

The following tables identify the awards made by directorates to the home institutions of Assistant Directors serving under the Intergovernmental Personnel Act (AD IPAs) during their time at NSF for the fiscal years ended September 30, 2020 and 2019. AD IPAs led five of the seven directorates during the fiscal year ended on September 30, 2020 and led six of the seven directorates during the fiscal year ended on September 30, 2019. NSF executive staff formulate directorate or office scientific goals, objectives, and priorities. Federal conflict of interest rules prohibit executives, including IPA detailees who serve in AD positions, from participating in matters where they have a conflict of interest or an impartiality concern. NSF grant awards are made pursuant to a merit-review based process and are not routinely reviewed by IPAs serving in executive positions. If matters are brought to such IPAs, they do not participate in the review or approval of awards to their home institutions. The following tables are provided in the interest of openness and transparency.

Table 3.6 – FY 2020 Awards to AD IPAs' Home Institutions
(Dollars in Thousands)

Directorate	Total Dollars and Awards Made by Directorate in FY 2020[3]	Home Institution of IPA Assistant Director	Total Dollars and Awards to Home Institution by Directorate in FY 2020	Total Dollars and Awards to Home Institution by NSF in FY 2020
Computer & Information Science & Engineering	$1,018,016 (3,666 awards)	Princeton University	$7,539 (36 awards)	$64,010 (149 awards)
Engineering	$1,022,730 (3,751 awards)	University of Michigan	$20,961 (69 awards)	$120,997 (329 awards)
Geosciences	$1,524,571 (2,569 awards)	Pennsylvania State University	$8,552 (33 awards)	$81,686 (267 awards)
Social, Behavioral, & Economic Sciences	$260,831 (1,387 awards)	University of Michigan	$10,468 (31 awards)	$120,997 (329 awards)
Education & Human Resources	$1,036,508 (1,993 awards)	Portland State University	$497 (2 awards)	$5,779 (28 awards)
Total	$4,862,656 (13,366 awards)		$48,017 (171 awards)	$272,472[4] (773 awards)

[3] Some NSF awards are split funded, meaning an award is funded by two or more directorates. For a split-funded award in this column: the award is counted for each directorate; the award funding is only the split-funded amount.
[4] Two IPAs from the University of Michigan served as Ads during the entire FY 2020. Award dollars and count have been reduced by $120,997 thousand and 329 awards, respectively, in this total box to avoid double counting.

Table 3.7 – FY 2019 Awards to AD IPAs' Home Institutions
(Dollars in Thousands)

Directorate	Total Dollars and Awards Made by Directorate in FY 2019[5]	Home Institution of IPA Assistant Director	Total Dollars and Awards to Home Institution by Directorate in FY 2019	Total Dollars and Awards to Home Institution by NSF in FY 2019
Computer & Information Science & Engineering	$982,907 (3,411 awards)	University of Massachusetts – Amherst	$11,749 (54 awards)	$47,655 (197 awards)
Education & Human Resources	$1,072,584 (1,772 awards)	Portland State University	$8,503 (8 awards)	$16,397 (37 awards)
Engineering	$970,592 (3,701 awards)	University of Michigan	$14,068 (52 awards)	$107,482 (299 awards)
Geosciences	$1,666,931 (2,549 awards)	The Pennsylvania State University	$13,147 (31 awards)	$77,300 (239 awards)
Mathematics & Physical Sciences	$1,556,611 (4,496 awards)	George Washington University	$634 (6 awards)	$11,373 (55 awards)
Social, Behavioral, & Economic Sciences	$239,443 (1,212 awards)	University of Michigan	$15,679 (32 awards)	$107,482 (299 awards)
Total	$6,489,068 (17,141 awards)		$63,780 (183 awards)	$260,207[6] (827 awards)

[5] Some NSF awards are split funded, meaning an award is funded by two or more directorates. For a split-funded award in this column: the award is counted for each directorate; the award funding is only the split-funded amount.
[6] Two IPAs from the University of Michigan served as ADs during the entire FY 2019. Award dollars and count have been reduced by $107,482,000 and 299 awards, respectively, in this total box to avoid double counting.

NSF SENIOR MANAGEMENT AND NATIONAL SCIENCE BOARD

NSF Senior Management

(as of September 30, 2020)

Office of the Director (O/D)
Sethuraman Panchanathan, *Director*
Vacant, *Deputy Director*
F. Fleming Crim, *Chief Operating Officer*
Brian Stone, *Chief of Staff*

O/D Offices

Office of Diversity & Inclusion
Rhonda Davis, *Head*
Affirmative Action Officer

Office of the General Counsel
Lawrence Rudolph, *General Counsel*

Office of Integrative Activities
Suzanne Iacono, *Head*

Office of International Science & Engineering
Rebecca S. Keiser, *Head (Acting)*

Office of Legislative & Public Affairs
Amanda Greenwell, *Head*

Directorate for Biological Sciences
Joanne S. Tornow, *Assistant Director*

Directorate for Computer & Information Science & Engineering
Margaret Martonosi, *Assistant Director*

Directorate for Education & Human Resources
Karen A. Marrongelle, *Assistant Director*

Directorate for Engineering
Dawn Tilbury, *Assistant Director*

Directorate for Geosciences
William E. Easterling, *Assistant Director*

Directorate for Mathematical & Physical Sciences
Sean L. Jones, *Assistant Director*

Directorate for Social, Behavioral, & Economic Sciences
Arthur W. Lupia, *Assistant Director*

Office of Budget, Finance, & Award Management
Teresa Grancorvitz, *Head*
Chief Financial Officer
Performance Improvement Officer

Office of Information & Resource Management
Wonzie L. Gardner, *Head*
Chief Human Capital Officer

Other Designated Senior Officials

Chief Information Officer
Dorothy Aronson (O/D)

Chief Officer for Research Facilities
James S. Ulvestad (O/D)

Chief of Research Security Strategy and Policy
Rebecca S. Keiser (O/D)

National Science Board Members in FY 2020

Terms expired May 10, 2020

John L. Anderson
National Academy of Engineering

Vicki L. Chandler*
Minerva Schools at KGI

Robert M. Groves
Georgetown University

James S. Jackson
University of Michigan

G.P. "Bud" Peterson
Georgia Institute of Technology

Diane Souvaine
Tufts University

Terms expire May 10, 2022

Arthur Bienenstock
Stanford University

W. Kent Fuchs
University of Florida

W. Carl Lineberger
University of Colorado

Victor R. McCrary, *NSB Vice Chair*
University of the District of Columbia

Emilio F. Moran
Michigan State University

Ellen Ochoa, *NSB Chair*
Lyndon B. Johnson Space Center (retired)

Julia M. Phillips
Sandia National Laboratories

Anneila I. Sargent
California Institute of Technology

Terms expire May 10, 2024

Maureen L. Condic
University of Utah

Suresh V. Garimella
University of Vermont

Stephen Leath
Iowa State University and Auburn University (retired)

Daniel A. Reed
University of Utah

Geraldine L. Richmond
University of Oregon

S. Alan Stern
Southwest Research Institute

Stephen H. Willard
Cellphire, Inc.

Maria T. Zuber

Massachusetts Institute of Technology

Terms expire May 10, 2026

Sudarsanam Suresh Babu
Oak Ridge National Laboratory/University of Tennessee, Knoxville

Roger N. Beachy
Washington University, St. Louis

Dario Gil
IBM

Aaron Dominguez
Catholic University of America, Washington, D.C.

Melvyn E. Huff
University of Massachusetts, Dartmouth

Heather A. Wilson
University of Texas, El Paso

*Member of the National Science Board whose term has recently expired, temporarily serving as a consultant to the Board

Member ex officio

Sethuraman Panchanathan, *NSF Director*

National Science Board Office

John J. Veysey, II, *Executive Officer*

Office of Inspector General

Allison C. Lerner, *Inspector General*

PATENTS AND INVENTIONS RESULTING FROM NSF SUPPORT

The following information about inventions is being reported in compliance with Section 3(f) of the National Science Foundation Act of 1950, as amended [42 U.S.C. 1862(f)]. There were 1,134 NSF invention disclosures reported to NSF either directly or through the National Institutes of Health's iEdison database during FY 2020. Rights to these inventions were allocated in accordance with Chapter 18 of Title 35 of the United States Code, commonly called the "Bayh-Dole Act."

ACRONYMS

ACM$	NSF Award Cash Management Service
AFR	Agency Financial Report
AI	Artificial Intelligence
AICA	American Innovation and Competitiveness Act of 2017
AIMS	Antarctic Infrastructure Modernization for Science
AOAM	Agency Operations and Award Management
APG	Agency Priority Goal
APR	Annual Performance Report
ASC	Antarctic Support Contractor
BFA	Office of Budget, Finance and Award Management
BSR	Business Systems Review
CA	Convergence Accelerator
CARES Act	Coronavirus Aid, Relief, and Economic Security Act
CAP	Cross-Agency Priority or Corrective Action Plan
CFO	Chief Financial Officers
CFOC	Chief Financial Officers Council
COO	Chief Operating Officer
COVID	Coronavirus
DATA Act	Digital Accountability and Transparency Act of 2014
DAIMS	DATA Act Information Model Schema
DQP	Data Quality Plan
EHR	Directorate for Education and Human Resources
ERM	Enterprise Risk Management
EVMS	Earned Value Management System
FASAB	Federal Accounting Standards Advisory Board
FBWT	Fund Balance with Treasury
FECA	Federal Employees' Compensation Act
FFMIA	Federal Financial Management Improvement Act of 1996
FFRDC	Federally Funded Research and Development Center
FISMA	Federal Information Security Modernization Act
FMFIA	Federal Managers' Financial Integrity Act of 1982
FPPS	Federal Personnel/Payroll System
FTE	Full-time Equivalents
FY	Fiscal Year
GAAP	Generally Accepted Accounting Principles
GAO	Government Accountability Office
GEO	Directorate for Geosciences
GPRA	Government Performance and Results Modernization Act of 2010
GRFP	Graduate Research Fellowship Program
GSA	General Services Administration
H-1B	H-1B Nonimmigrant Petitioner Account
HPC	high performance computing
IBC	Interior Business Center
IG	Inspector General

INCLUDES	Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science
IPA	Intergovernmental Personnel Act
IPERA	Improper Payment Elimination and Recovery Act
IR/D	Independent Research/Development
IT	Information Technology
iTRAK	NSF's financial management system
JCORE	Joint Committee on Research Environment
K-12	Kindergarten to Grade 12
LFO	Large Facilities Office
MFG	Major Facilities Guide
MOSAiC	Multidisciplinary Drifting Observatory for the Study of Arctic Climate
MREFC	Major Research Equipment and Facilities Construction
NSB	National Science Board
NSF	National Science Foundation
O/D	Office of the Director
OIG	Office of Inspector General
OMB	Office of Management and Budget
OPM	Office of Personnel Management
OPP	Office of Polar Programs
PAPPG	Proposal and Award Policies and Procedures Guide
PL	Public Law
PP&E	General Property, Plant, and Equipment
R&D	Research and Development
R&RA	Research and Related Activities
RECR	Responsible and Ethical Conduct of Research
RCRV	Regional Class Research Vessels
SAM	System for Award Management
SBIR	Small Business Innovation Research
SBR	Statement of Budgetary Resources
SES	Senior Executive Service
SFFAS	Statement of Federal Financial Accounting Standards
SOG	Standard Operating Guidance
SSAE	Statement of Standards for Attestation Engagements
STEM	Science, Technology, Engineering, and Mathematics
STTR	Small Business Technology Transfer
USAP	U.S. Antarctic Program
USSGL	United States Standard General Ledger