National Science Foundation

FY 2023
Agency Financial Report

MISSION

To promote the progress of science;
to advance the national health, prosperity, and welfare;
and to secure the national defense; and for other purposes.

—from The National Science Foundation Act of 1950 (P.L. 81-507)

VISION

A nation that leads the world in science and engineering research and innovation,
to the benefit of all, without barriers to participation.

—from "Leading the World in Discovery and Innovation, STEM talent Development and the Delivery of Benefits from Research"
NSF Strategic Plan for FY 2022-2026

ABOUT THIS REPORT

For fiscal year (FY) 2023, the National Science Foundation (NSF) issues two reports to provide financial management and program performance information to demonstrate accountability to our stakeholders and the American public. These reports are produced using guidance from the Office of Management and Budget and meet the requirements of the Chief Financial Officers (CFO) Act, as amended by the Government Management Reform Act of 1994, the Federal Managers' Financial Integrity Act of 1982, the Reports Consolidation Act of 2000, and the Government Performance and Results Modernization Act of 2010.

The ***Agency Financial Report*** (AFR) focuses on financial management and accountability. Below is a high-level summary of the AFR's three chapters:

- *Chapter 1: Management's Discussion & Analysis* provides a high-level overview of NSF's organizational structure, strategic framework, programmatic and financial performance, and management assurances related to NSF's internal controls.
- *Chapter 2: Financials* includes the results of NSF's annual financial statement audit and financial statements and accompanying documents.
- *Chapter 3: Appendices (Other Information)* contains the memorandum from the NSF Inspector General (IG) on the agency's FY 2024 management challenges, NSF management's progress report on the challenges identified by the IG for FY 2023, information on grant reporting, patents and inventions resulting from NSF support, and other relevant information.

- The ***Annual Performance Report*** (APR) provides information on the progress NSF has made toward achieving its goals and objectives as described in the agency's strategic plan and Annual Performance Plan, including the strategic objectives, performance goals, and Agency Priority Goals. The *APR* will be included in NSF's *FY 2025 Budget Request to Congress.*

The AFR and APR are available on NSF's website as they are completed.[1] We welcome your suggestions on how we can make these reports more informative. You can reach us at: accountability@nsf.gov or call (703) 292-8200.

NSF by the Numbers	
$9.9 billion	FY 2023 Appropriations (does not include mandatory accounts)
2,000	Colleges, universities, and other institutions receiving NSF funding in FY 2023
38,000	Proposals evaluated in FY 2023 through a competitive merit review process
11,000	Competitive awards funded in FY 2023
180,000	Proposal reviews conducted in FY 2023
353,000	Estimated number of people NSF supported directly in FY 2023 (researchers, postdoctoral fellows, trainees, teachers, and students)[2]
68,000	Students supported by NSF Graduate Research Fellowships since 1952

Numbers are rounded.

[1] Online resource for NSF's accountability reports: https://www.nsf.gov/about/performance/

[2] Preliminary data. Updated number will be in the FY 2025 Budget Request to Congress: https://new.nsf.gov/about/budget

TABLE OF CONTENTS

MESSAGE FROM THE DIRECTOR

Photo: NSF/Stephen Voss

I am pleased to present the National Science Foundation's (NSF's) *Fiscal Year 2023 Agency Financial Report*. The AFR is NSF's principal report demonstrating our commitment to sound financial management and providing key financial and performance information to our stakeholders and the American people.

For 73 years, NSF-funded research programs and initiatives have advanced knowledge that fosters scientific innovation, drives the economy, strengthens national security, and enhances the well-being of Americans. Today, many of the technologies and industries at the root of U.S. economic competitiveness — such as advanced manufacturing, biotechnology, microelectronics and semiconductors, and quantum computing — emerged from and are accelerated by NSF investments.

In FY 2023, NSF's research goals were emboldened by the CHIPS and Science Act of 2022, an historic investment by Congress and the Administration that is already sharpening the focus on technology and innovation. In tandem with our continued focus on supporting curiosity-driven research, NSF leadership is positioning the agency to foster knowledge transfer at speed and scale that accelerates the adoption of new technologies, safeguards U.S. investments through enhanced research security, and strengthens the discovery ecosystem. To facilitate these important goals, the Foundation has continued to encourage diversity, equity, inclusion, and accessibility within the NSF workforce, ensure equity in the implementation and execution of NSF programs, and to develop domestic STEM talent across every geographic region and demographic background. Investing in U.S. STEM research and development with complementary investments in the workforce enterprise unleashes opportunities for everyone and innovation everywhere.

NSF programs are built on the solid foundation of careful stewardship of public funds and reporting of accurate data and information on NSF's fiscal operations, as detailed in this report. With the publication of the *FY 2023 Agency Financial Report*, I am pleased to report that for 26 consecutive years, NSF has received an unmodified "clean" opinion on its financial statements. The independent auditors did not identify any material weaknesses or significant deficiencies. In addition, NSF provided reasonable assurance that the agency complied with the "Federal Managers' Financial Integrity Act" and that internal controls were operating effectively to support accurate financial reporting. The AFR also includes summary performance information for FY 2023. For more information on NSF's performance management process and the complete results of our FY 2023 annual goals under the "Government Performance and Results Modernization Act of 2010," I invite you to read NSF's *Annual Performance Report*, which will be released with NSF's *FY 2025 Budget Request to Congress*.

Thank you for your interest in the National Science Foundation—where discoveries begin.

/s/
Sethuraman Panchanathan

November 14, 2023

Chapter 1
Management's Discussion and Analysis

Agency Overview

Mission and Vision

The National Science Foundation (NSF) was established in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense…"[1] This mission remains relevant today as the agency supports research across all fields of science, technology, engineering, mathematics (STEM), and all levels of STEM education.

For more than seven decades, NSF has supported scientists and research that explores the unknown, and expands the frontiers of science and engineering. NSF-funded discoveries have led to essential breakthroughs and innovations that address the scientific, economic, and societal challenges facing the U.S. and the world. These discoveries often arise from research inspired by real-world needs and focused on practical solutions. Technologies like the Internet and 3D printing continue to evolve, while CRISPR reveals the blueprint of life, facilitating advances from COVID-19 vaccines to the creation of climate- and disease-resistant crops. These are just a few examples highlighting the outcomes and benefits of NSF's investments in fundamental research.

An electron microscope image of tiny, finely layered metal structures known as MXenes, between which scientists can slip different ions for various purposes. These MXenes were grown using a simplified and less toxic method invented by NSF-funded researchers. They hold promise for future high-tech electronics or energy storage. *Credit: Di Wang and Dmitri Talapin, University of Chicago.*

MXenes – An easy way to make atomically thin metal layers for new technology

MXenes, metals first synthesized in 2011, consist of atomically thin layers of transition metals that ions can move between. Unlike other metals, MXenes do not lose their properties (e.g., strong electrical conductivity) when in atomically thin layers, thanks to their strong chemical bonds. MXenes have historically been labor-intensive to make, but researchers at the University of Chicago were able to find a more efficient process with less toxic byproducts. This new process will allow for more metal alloy-MXene mixtures and different ions to flow between the layers. This advancement will lead to new devices that could potentially store energy or block electromagnetic wave interference.

Across all fields of STEM, NSF's investment in fundamental research and development has been a catalyst for transformative breakthroughs. For example, fiscal year (FY) 2023 funding supported multidisciplinary teams developing novel materials with broad, practical applications in healthcare, climate change, next-generation computing, and communications; biologists researching biological systems that improve food security and monitor drinking water for contaminants; and researchers in Antarctica advancing the field of neutrino astronomy with groundbreaking insights on the nature of the universe.

[1] National Science Foundation Act of 1950 (Public Law 81–507).

In addition to broadening access to research infrastructure and building interdisciplinary communities of researchers, research partnerships can accelerate scientific discovery as well as the translation of research into products and services. In FY 2023, NSF utilized CHIPS and Science Act funding to advance a public-private partnership supporting microelectronic and semiconductor investments. This effort will enable rapid progress in new semiconductor technologies and manufacturing, as well as in workforce development. NSF's decades of promoting collaboration among industry, academia, and government have propelled the American research enterprise and helped to secure our Nation's global leadership in science and technology.

The CREST Center for Advanced Magnets and Semiconductors at Morgan State University will advance scientific knowledge in advanced magnets and semiconductors, a field of great importance to modern technologies and the U.S. economy. *Credit: NSF.*

Center of Research Excellence in Science and Technology (CREST) Phase I Center for Advanced Magnets and Semiconductors

A new research and educational hub is being established at Morgan State University in Baltimore with funding from NSF's Center of Research Excellence in Science and Technology (CREST) program. The $5 million, 5-year award was partly funded through the CHIPS and Science Act of 2022 and will support Morgan State University, the largest historically Black college and university (HBCU) in Maryland, in playing a vital role in producing a highly talented and diverse technology workforce. The center will partner with neighboring institutions to perform bold, innovative studies in advanced magnets and semiconductors and oversee STEM education and outreach initiatives for underrepresented minorities. This includes developing two new graduate programs, joint educational initiatives such as symposia and internships, and summer programs for high school students and science teachers.

NSF's sustained commitment to investing in our country's infrastructure, emerging technologies, and workforce development helps ensure every citizen has the opportunity to prosper in America's STEM-based workforce. This investment keeps the Nation's workers competitive and prepares them for future challenges. Core to these investments is an intentional focus on broadening participation in STEM, particularly by increasing engagement with minority-serving institutions (MSIs), community colleges, and other emerging research institutions. Capitalizing on the perspectives brought by these partner organizations is critical to creating truly transformational breakthroughs. One example is the GRANTED (Growing Research Access for Nationally Transformative Equity and Diversity) program. Launched in FY 2023, GRANTED aims to develop research capacity at emerging and developing research institutions to broaden participation and foster the skills and desire to serve within the Nation's science and engineering enterprise.

NSF's support for the Graduate Research Fellowship Program (GRFP) is an important component of its STEM workforce portfolio. Since 1952, NSF has funded approximately 68,000 Graduate Research Fellows, many of whom become leaders in their chosen fields and make groundbreaking and important discoveries in STEM research. NSF also has funded the research of 261 individuals who have won the Nobel Prize, along with 44 individuals who have won the Association for Computing Machinery (ACM) A. M. Turing Award, often referred to as the "Nobel Prize of Computing." NSF

programs and investments provide every aspiring scientist and engineer a real chance to prepare for and compete in their field.

A long-standing priority for NSF is the translation of science and engineering discoveries into innovative technologies and solutions that reach the marketplace and society. Key investments made in support of this priority include Partnerships for Innovation, NSF Innovation Corps (I-Corps™), and America's Seed Fund™ (also known as the Small Business Innovation Research and Small Business Technology Transfer [SBIR/STTR] programs). These programs support researchers as they pilot, prototype, and demonstrate their innovations and technologies. The programs facilitate the licensing of NSF-funded research outcomes and provide opportunities for entrepreneurial education. NSF investments have inspired start-up creation and fostered small businesses that have forged generations of new American jobs and, through these outcomes and innovations, have benefitted our society, economic competitiveness, and national security.

The first-ever Engines awards will help regional partners collaborate to advance key technologies, address societal challenges, and create economic opportunities. *Credit: NSF.*

NSF Regional Innovation Engines

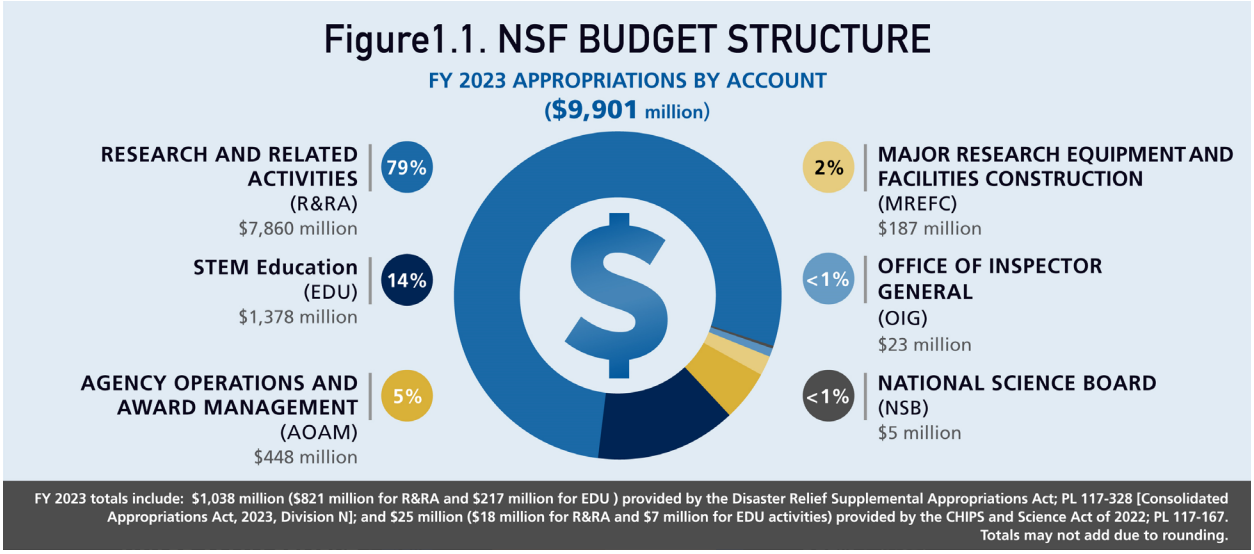
The NSF Regional Innovation Engines competition links local and regional partners to expand innovation and create collaborative, inclusive, and technology-driven innovation ecosystems across the Nation. The NSF Engines program is anticipated to be transformational for the Nation, ensuring the U.S. remains globally competitive in key technologies for decades to come. NSF named 16 finalists in August, spanning a range of key technologies as well as national, societal, and geostrategic challenges highlighted in the CHIPS and Science Act of 2022. Over a 10-year period, an NSF Engine recipient is expected to progress through three phases: nascent, emergent, and growth. When successful, an NSF Engine will lead to its region becoming a self-sustaining hub of economic activity for its specialized field.

NSF invests in a wide array of research infrastructure that is geographically distributed and broadly accessible to advance discovery, learning, and exploration. This infrastructure includes observatories, detectors, optical and radio telescopes research vessels, aircraft and autonomous airborne platforms, and other state-of-the-art tools. These essential investments foster collaboration and provide sophisticated research platforms. In 2023, NSF was an essential leader supporting scientists working to understand black holes at NSF-funded facilities (such as the Laser Interferometer Gravitational-Wave Observatory, the Event Horizon Telescope, and the international Atacama Large Millimeter/submillimeter Array), as well as providing data analysis time on supercomputers. In 2023, NSF supported improving computational models used for lifesaving weather predictions and climate projections by funding a Mid-scale Research Infrastructure-2 award to create the Airborne Phased Array Radar, which will provide critical input to those models. The Foundation's long-term commitment to steady advancements and upgrades to research facilities enables continued groundbreaking research across scientific disciplines.

NSF's vision is for the Nation to lead the world in science and engineering research and innovation, to the benefit of all, without barriers to participation. NSF staff pursue this vision by working to expand the frontiers of knowledge and integrate that knowledge into industry and education. In addition, NSF's core values include diversity and inclusion, integrity and excellence in devotion to public service, and innovation and collaboration in our support of the work of the scientific community and of each other. These values and the agency's vision are embodied in the plan's strategic goals: (1) EMPOWER: empower STEM talent to fully participate in science and engineering; (2) DISCOVER: create new knowledge about our universe, the world, and ourselves; (3) IMPACT: benefit society by translating knowledge into solutions; and (4) EXCEL: excel at NSF operations and management.

NSF by the Numbers

NSF is funded primarily through congressional appropriations that are provided to six accounts (shown in Figure 1.1): Research and Related Activities (R&RA), STEM Education (EDU), Major Research Equipment and Facilities Construction (MREFC), Agency Operations and Award Management (AOAM), the National Science Board (NSB), and the Office of Inspector General (OIG). Appropriations in these six accounts in FY 2023 totaled $9,901 million.[2] In FY 2023, R&RA, EDU, and MREFC appropriations funded the agency's programmatic activities, accounting for 95 percent of NSF's total appropriations.



- R&RA invests in early-stage research and the development of a future-focused science and engineering workforce that can accelerate progress in fundamental and translational science and engineering research as well as support the private sector. This appropriation accounted for 79 percent of FY 2023 funding. The FY 2023 R&RA funding level of $7,860 million was approximately $860 million higher than FY 2022.

[2] Amount shown is NSF's FY 2023 discretionary appropriations. This amount does not include Donations and H-1B Nonimmigrant Petitioner Receipts. These amounts are included in NSF's appropriations shown in the Statement of Budgetary Resources (SBR). The SBR is on page Financials-19 of this Agency Financial Report (AFR).

- Funding within NSF's EDU appropriation invests in education and training programs to help prepare a diverse, domestic STEM workforce. These investments—spanning pre-K through graduate school and beyond—ensure pathways for people and ideas ready to solve pressing global challenges in science and engineering. EDU is NSF's second-largest appropriation and is 14 percent of the agency's budget. EDU's FY 2023 funding level of $1,378 million was $229 million above the previous year's appropriation of $1,149 million. Until FY 2023, the EDU appropriation was named Education and Human Resources (EHR).
- The MREFC appropriation supports the acquisition, construction, and commissioning of major facilities and larger mid-scale research infrastructure, providing unique capabilities at the frontiers of science and engineering. This account was 2 percent of the agency's total appropriations in FY 2023. The FY 2023 MREFC funding level of $187 million was $53 million lower than the FY 2022 level. Fluctuations in funding reflect changes in construction project requirements.
- FY 2023 AOAM funding of $448 million supported NSF agency operations and award management activities through which NSF's science and engineering research and education programs are administered. AOAM was 5 percent of NSF's total FY 2023 appropriations, and funding increased by $23 million between the two years.
- Separate appropriations support the activities of the OIG and the NSB; each accounted for less than 1 percent of NSF's total FY 2023 appropriations. The FY 2023 OIG appropriation of $23 million increased approximately $4 million over the FY 2022 appropriation. The NSB received an appropriation of $5 million in FY 2023, almost $500,000 higher than the previous year's funding level.

During FY 2023, NSF evaluated over 38,000 proposals through a competitive merit review process and made over 11,000 new competitive awards, primarily to academic institutions. In addition to these proposals, GRFP reviewed about 13,000 applications for fellowships. Almost 31,000 members of the science and engineering community participated in the merit review process as panelists and proposal reviewers.[3] Awards were made to 1,850 institutions in all 50 states, the District of Columbia, and four U.S. territories. These institutions employ many of America's leading scientists, engineers, and educators; and they train the leading innovators of tomorrow. In FY 2023, approximately 353,000 people were directly involved in NSF-funded programs and activities. Beyond these figures, NSF programs indirectly impact millions of people, reaching K-12 students and teachers, the general public, and researchers through activities including workshops; informal science activities, such as museums, television, videos, and journals; outreach efforts; and dissemination of novel curriculum and teaching methods.

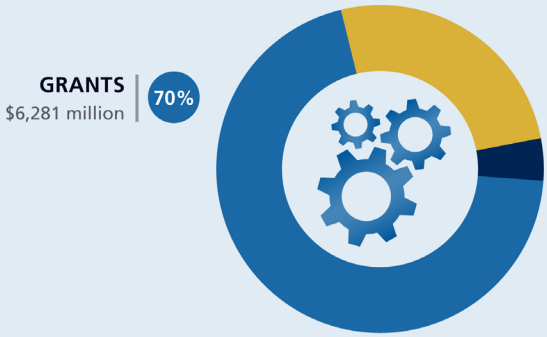
As shown in Figure 1.2, NSF's award funding was used primarily for financial assistance to carry out a public purpose through grants and cooperative agreements. Grants can be either standard awards, in which funding for the full duration of the project is awarded in a single fiscal year, or continuing awards, in which funding for a multiyear project is awarded in increments. Cooperative agreements are used when the project requires substantial agency involvement (such as research centers and

[3] For more information about NSF's merit review process, see https://www.nsf.gov/bfa/dias/policy/merit_review/ and *NSF's Merit Review Process, FY 2021 Digest* (NSB-2023-14) at https://www.nsf.gov/nsb/publications/2022/merit_review/nsb202314.pdf.

major facilities). Contracts are generally used for the direct benefit of the federal government (i.e., to acquire products or services), but they may be used to benefit the public in specific circumstances. On a limited basis in FY 2023, NSF used "other arrangements" and "other transaction authority" to make awards. These two mechanisms support innovative approaches to fund programs managed by the Technology, Innovation and Partnerships (TIP) directorate.

Figure 1.2. NSF AWARD MECHANISMS

FY 2023 OBLIGATIONS FOR RESEARCH AND EDUCATION PROGRAMS
($9,003 million)



GRANTS 70%
$6,281 million

COOPERATIVE AGREEMENTS 26%
$2,349 million

CONTRACTS 4%
$373 million

NSF Research and Education programs include Research and Related Activities, STEM Education, and Major Research Equipment and Facilities Construction appropriations.
Totals may not add due to rounding.

As shown in Figure 1.3, 78 percent of support for research and education programs ($7,042 million) was provided to colleges, universities, and academic consortia. Private industry, including small businesses and nonprofit organizations, accounted for 13 percent ($1,208 million), and support to Federally Funded Research and Development Centers accounted for 4 percent ($353 million). Other recipients (i.e., federal, state, and local governments; and international organizations) accounted for 4 percent ($400 million) of support for research and education programs.

Figure 1.3. INSTITUTIONS FUNDED BY NSF

FY 2023 OBLIGATIONS FOR RESEARCH AND EDUCATION PROGRAMS
($9,003 million)

COLLEGES, UNIVERSITIES, AND ACADEMIC CONSORTIA 78%
$7,042 million

PRIVATE INDUSTRY 13%
(includes nonprofit organizations)
$1,208 million

OTHER 4%
(includes federal, state, and local governments; and international organizations)
$400 million

FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS 4%
$353 million

NSF Research and Education programs include Research and Related Activities, STEM Education, and Major Research Equipment and Facilities Construction appropriations.
Totals may not add due to rounding.

Organizational Structure

NSF is an independent federal agency headed by a director who is appointed by the President and confirmed by the U.S. Senate.[4] As shown in Figure 1.4, NSF's organizational structure generally aligns with the major fields of science and engineering.[5]

Figure 1.4 FY 2023 Organizational Chart

The NSF Director and the 24-member NSB jointly pursue the goals and functions of NSF, including the duty to "recommend and encourage the pursuit of national policies for the promotion of research and education in science and engineering."[6] The NSB identifies issues critical to NSF's future and helps chart the strategic direction of NSF's budget and programs. The President appoints NSB members who are prominent contributors to the STEM research and education community.[7] NSF's Director is a member *ex officio* of the Board. The Director and the other NSB members serve 6-year terms.

In FY 2023, NSF's workforce comprised approximately 1,500 federal employees and 200 scientists on temporary appointments under the Intergovernmental Personnel Act (IPA) program.[8] NSF regularly recruits scientists, engineers, and educators through the IPA program who work at NSF for up to 4 years. They bring relevant perspectives from across the country and all fields of science supported by NSF, helping explore new directions for research in science, engineering, and education, including

[4] The Director's biography: https://www.nsf.gov/staff/staff_bio.jsp?lan=spanchan&from_org=
[5] NSF's organization chart: https://www.nsf.gov/staff/organizational_chart.pdf
[6] 42 U.S. Code 1862(d): https://www.law.cornell.edu/uscode/text/42/1862.
[7] NSB members during FY 2023 are shown in Appendix 9 of this AFR.
[8] The 1,540 Full-time equivalents (FTEs) in FY 2023 included the federal employee workforce for NSF, the NSB, the OIG, and U.S. Arctic Research Commission.

emerging interdisciplinary fields. On returning to their home institutions from across academia, they bring knowledge of NSF programming and leading research from a national perspective.

In addition to the Foundation's headquarters in Alexandria, Virginia, NSF maintains an office in Christchurch, New Zealand, to support the United States Antarctic Program.

Management Challenges

In October 2022, the OIG identified eight management challenges for NSF in FY 2023.[9] Management's report on the significant activities undertaken in FY 2023 to address these challenges is included in *Appendix 2B: Management Challenges – NSF's Response* of this Agency Financial Report (AFR). The report also discusses planned activities to address these challenges in FY 2024 and beyond. The following are highlights of the agency's significant actions and planned next steps to address the FY 2023 OIG Management Challenges.

Increasing Diversity in Science & Engineering Education and Employment

The lived experiences, cultural diversity, and range of viewpoints of the individuals working in STEM fields are critical to actualizing an inclusive STEM workforce, thereby underscoring the importance of increasing diversity in science and engineering education and employment. Inspired by the NSF Director's visionary leadership, the NSF Equity Ecosystem framework was created to address this Management Challenge. This framework arranges equity-related actions along three lines of effort: encouraging diversity, equity, inclusion, and accessibility (DEIA) within the NSF workforce; ensuring equity in the delivery of NSF programs; and widening engagement in STEM. In FY 2023, demonstrated progress towards this end is evidenced by the establishment of the Chief Diversity and Inclusion Officer position to enhance coordination and oversight of the agency's initiatives to increase participation in STEM fields and to direct the implementation of the DEIA Strategic Plan for 2022–2024. Across every NSF directorate and office, new funding opportunities have been developed or existing ones renewed to diversify the STEM workforce. In addition, there are coordinated efforts to advance the Agency Priority Goal to "Improve representation in the scientific enterprise," which is focused on expanding the representation of investigators and institutions submitting proposals to NSF. Going forward, NSF will continue to leverage its expertise on broadening participation by facilitating discussions across various communities of practice, as well as increasing and diversifying external engagements with underrepresented communities and emerging research institutions, particularly minority-serving institutions and those institutions located within Established Program to Stimulate Competitive Research (EPSCoR) jurisdictions.

[9] Inspector General's Management Challenges for NSF in Fiscal Year 2023 can be accessed at https://oig.nsf.gov/sites/default/files/reports/2022-11/Management-Challenges-National-Science-Foundation-Fiscal-Year-2023.pdf.

NSF funding drives semiconductor industry in Arkansas

Arkansas has a strong track record in semiconductor and microelectronics research dating back to the 1970s. More than 20 companies in Arkansas manufacture semiconductors and related components, and NSF has awarded more than $80 million to Arkansas colleges and universities for semiconductor-related research and education since 1990. This includes strategic investments like the EPSCoR-funded Arkansas Advancing and Supporting Science, Engineering and Technology Initiative, which supported a number of projects related to nanotechnology and microelectronics, as well as investments in 11 related start-up ventures and private firms. More recent NSF awards include an $18 million grant co-funded by the EPSCoR and mid-scale research infrastructure programs to build and operate a national silicon carbide research and fabrication facility at the University of Arkansas, which will be the only openly accessible fabrication facility of its kind in the U.S.

Technicians learn to operate equipment to make semiconductors. *Credit: ATE Impacts.*

Overseeing the United States Antarctic Program (USAP)

Antarctica's remote location, extreme environment, and the short period of time each year during which the continent is accessible present challenges above and beyond those typically encountered for domestic construction projects and science operations. USAP's recovery from two seasons of drastic curtailment of activity during the pandemic is now underway. Construction on the Antarctic Infrastructure Modernization for Science project and the Information Technology and Communications primary addition resumed in FY 2023. A major focus of USAP in FY 2023 was implementing actions under the Sexual Assault and Harassment Prevention and Response (SAHPR) initiative, including hosting over 60 bystander trainings, deploying an On-Ice Victim Advocate, and establishing a 24/7 Antarctic Helpline. Going forward, NSF will complete a comprehensive USAP Climate Survey, continue efforts to transition to enhanced screening procedures for contractors, and expand preventive training to advance SAHPR efforts.

Overseeing Grants in a Changing Environment

NSF is taking important steps to position itself to effectively manage its evolving grant environment while implementing the requirements of the CHIPS and Science Act of 2022. It is conducting a strategic and methodical assessment of its current award oversight and control environment to proactively adapt to current and prospective grant portfolio changes. To focus on agency implementation activities, facilitate knowledge sharing, coordinate legislative requirements, and develop strategies, NSF has developed coalitions with other federal entities to exchange information and has established internal groups, including the EPSCoR Strategy, Engagement, and Consultation Group to help meet increased funding targets for EPSCoR jurisdictions. NSF will continue to invest resources into its ongoing objective to increase diversity in the STEM workforce and expand the institutional and geographic diversity of federal award recipients. Further, NSF's Enterprise Risk Management and award monitoring programs provide a strong foundation for the agency to address emerging risks.

For instance, NSF was able to leverage the agency's existing advanced monitoring program by providing pre-award business assistance and including special terms and conditions that established additional monitoring and controls for new TIP awardee recipients. The agency has also been reassessing its fraud risk inventory to evolve its risk mitigation and response strategies alongside changes to its financial assistance portfolio.

Computing The Biome researchers are developing new AI models that recognize disease-transmitting and invasive species instantaneously. These are being deployed onto Microsoft Premonition's Biological Weather Stations together with Harris County Public Health to enhance public health and biosecurity. *Credit: Microsoft.*

Biological weather stations identify threats with Artificial Intelligence

A team led by Vanderbilt University is creating a platform to detect biological threats and predict disease outbreaks in major cities. Under a $5 million NSF cooperative agreement, the Computing the Biome effort initially focused on monitoring and predicting mosquito-borne diseases. The team of engineers, computer scientists, biologists, epidemiologists, and public health and policy experts from multiple organizations built data streams that combine information such as hyper-local weather, autonomously identified disease-transmitting insects, and genetically identified viruses and microbes. Artificial Intelligence (AI) systems use this data to detect and predict biothreats. The project was deployed in Houston and Harris County, Texas, and tests are being conducted in Nepal. The effort is one of 34 projects supported under Phase 2 of NSF's Convergence Accelerator program.

Managing the Intergovernmental Personnel Act (IPA) Program

NSF provides the opportunity for scientists, engineers, and educators to rotate into the agency on a temporary basis, bringing fresh perspectives from across all fields of science and engineering supported by the agency. NSF takes a proactive approach to managing the IPA program to appropriately consider and mitigate inherent risks associated with its execution, including through an IPA Steering Committee that advises the senior leadership on matters that directly concern policy on the use of the IPA Program.

NSF has identified the need to better vet incoming IPA rotators via the recent OIG audit of the agency's internal processes. To address concerns and risks identified, NSF established an IPA Vetting Working Group comprising agency leaders and subject matter experts. The Working Group has made recommendations to the Chief Operating Officer regarding the agency's approach to vetting candidates for IPA positions at NSF. The Working Group will continue to partner with NSF stakeholders to address issues such as (1) potential threats to national or economic security by IPA candidates with foreign affiliations or sources of funding; (2) potential risks due to other conflicts of interest and commitments; and (3) timeliness of vetting relative to employment offers and start of assignment.

Earthquake tests could help sustainable wooden structures reach new heights

Buildings constructed with mass timber—layers of bonded wood—can be erected more quickly and are more sustainable than those built with traditional construction materials. With building codes in the U.S. revised in the last few years to permit mass timber buildings of up to 18 stories, engineers want to determine the resilience of mass timber in earthquake zones. A team of structural engineering researchers subjected a 10-story mass timber building to a series of simulated earthquakes. The TallWood project took place at the Natural Hazards Engineering Research Infrastructure (NHERI)'s Large High-Performance Outdoor Shake Table at the University of California, San Diego. Both the NHERI TallWood project and the shake table are funded by NSF to advance the Nation's infrastructure resilience.

The 10-story mass timber building under construction on the shake table. *Credit: Shiling Pei/Colorado School of Mines.*

Overseeing NSF-Funded Research Infrastructure

NSF funds recipient institutions to manage the development, design, construction, operation, and disposition of research infrastructure (RI), which are state-of-the art facilities that support research and education, including telescopes, ships, detectors, and distributed observatories. The RI portfolio is complex and has certain inherent risks, including meeting emergent scientific objectives, protecting the safety of life and property, potential implementation delays, and unanticipated additional costs. In FY 2023, NSF has continued to use the Office of the Director's Watch List to monitor projects at risk of experiencing cost or schedule overruns or performance issues or constituting a new, high-risk, large-scale endeavor for the agency. NSF also issued guidance, including a revised *Business System Review Guide* and *Mid-scale RI Pre-award Review Guidance.* Going forward, NSF will continue to enhance professional development for the RI oversight workforce, work across the agency to "right-size" mid-scale RI oversight, and implement corrective actions related to an OIG audit of divestment of major facilities.

Mitigating Threats to Research Security

NSF seeks to maintain a vibrant science and engineering community for the benefit of the Nation and to preserve the integrity of international collaboration. However, open scientific exchange and research face a challenge from some foreign governments. To mitigate threats to research security, NSF established the Office of the Chief of Research Security, Strategy and Policy and took multiple actions in FY 2023 to continue progress on this issue.[10] The agency accomplished the following: 1) collaborated with the research community to develop research security training modules; 2) published a solicitation to establish the Safeguarding the Entire Community in the U.S. Research Ecosystem or SECURE Center (officially called the Research Security and Integrity Information Sharing Analysis Organization in the CHIPS and Science Act of 2022); 3) continued to serve as a co-chair on the National Science and Technology Council, Research Security Subcommittee to coordinate research

[10] See updates at "Research Security at the National Science Foundation" at https://new.nsf.gov/research-security.

security efforts across the U.S. Government; 4) developed internal guidance and public-facing guidelines on research security data-related practices to define how NSF assesses research security-related risk and scaled data analytics capabilities; 5) created a process to support the vetting of incoming IPA assignments at NSF to mitigate research security-related risks; 6) began concept development and published proposed data elements for the foreign financial disclosure requirement under Section 10339B of the CHIPS and Science Act; and 7) initiated a pilot for the forthcoming malign foreign talent program prohibition under section 10632 of the CHIPS and Science Act. Going forward, NSF will continue to work with federal partners to meet CHIPS and Science Act research security and related requirements, develop and deliver additional trainings on research security for the research community, and continue to refine and scale up research security-related analytics capabilities.

Mitigating Threats Posted by the Risk of Cyberattacks

NSF recognizes the cybersecurity challenges of a digital federal government. NSF continues to implement a Zero Trust Architecture (ZTA), focusing on priority tasks to address the five pillars of the Zero Trust Maturity Model and to implement required actions in support of ZTA principles. NSF's near-term zero trust efforts are focused on establishing new capabilities to reduce risk and protect sensitive agency data from compromise. To this end, NSF made progress in the implementation of enterprise identity management and phishing-resistant multifactor authentication. The Foundation also enhanced logging and information-sharing capabilities and expanded retention periods to further enhance event correlation and incident management. To improve vulnerability information, NSF enhanced threat feed information and updated and implemented its password policy. NSF made significant progress in moving information technology systems and services to the cloud to modernize legacy technology, improve capacity and uptime, enable standardization of services, and leverage the security benefits of cloud-based infrastructure. Over 80 percent of NSF business applications and services are in the cloud. Also, NSF maintains strong access controls and a robust capability to quickly detect and respond to incidents, including state-of-the-art network and security protections.

Jumpstart into Cyber Summer Program

In partnership with the SANS Institute in Virginia, Whatcom Community College in Washington, and Sinclair Community College in Ohio, NSF launched the Jumpstart into Cyber Summer Program to create opportunities for technological innovation and prepare a skilled cyber workforce capable of solving the Nation's future challenges. Jumpstart into Cyber is designed to engage and empower students from groups underrepresented in STEM, including female, Black, African American, Latino, Hispanic, and Indigenous students. The program offers an unparalleled opportunity to gain valuable cybersecurity skills and preparation for future careers through a two step training course. Upon completion, this program will equip students with the knowledge and experience necessary to pursue the Global Information Assurance Certification (GIAC) Foundational Cybersecurity Technologies certification, a highly regarded credential in the cybersecurity industry.

Jumpstart into Cyber focuses on engaging underrepresented student groups in cybersecurity education. *Credit: ATE Impacts.*

Going forward, NSF will continue to refine its long-term ZTA migration plan in alignment with the Zero Trust Maturity Model and adapt its approach as federal guidance clarifies requirements around emerging zero trust requirements. To protect NSF sensitive data on removable storage devices, NSF will implement tools to only allow authorized removable media to be used on NSF-managed devices.

Addressing Harassment in the Academic Community

NSF is committed to combatting harassment and sexual assault anywhere science or education is conducted, including research stations, vessels, field sites, and NSF-funded programs. NSF has taken steps to help ensure all NSF-funded research and learning environments are free from sexual and other forms of harassment. Among other actions, NSF established a new SAHPR Office to serve as NSF's centralized communication point for sexual assault and sexual harassment matters, ensuring such matters are appropriately referred and providing access to resources and guidance to help prevent sexual assault and harassment. NSF continually bolsters its policies, guidelines, and stakeholder engagement so organizations clearly understand expectations and individuals understand their rights. For example, NSF continued to receive, review, and monitor notifications filed under the award term and condition that requires institutions to report findings of harassment or assault by NSF-funded principal investigators or co-principal investigators, and NSF reaffirmed expectations that research organizations establish and maintain clear and unambiguous standards of behavior.

Moving into FY 2024, NSF remains committed to continuing the work to combat sexual misconduct and to ensure all NSF-funded environments are safe, harassment- and assault-free spaces with a positive and inclusive culture.

Breakthrough in computer chip energy efficiency could cut data center electricity use

NSF funds several National Nanotechnology Coordinated Infrastructure (NNCI) centers. The NNCI Northwest Nanotechnology Infrastructure based in Seattle, Washington, and Corvallis, Oregon, has several projects, including photonic chips—microchips that use photons instead of electrons in integrated circuits. Photonic chips are currently used in multiple fields, including data and telecommunications, health and medicine, automotive manufacturing, and agriculture. Researchers at Oregon State University and Baylor University created a type of silicon photonics that reduce the energy consumption of chips used in supercomputers and data centers. Silicon photonics use silicon as the material light or other electromagnetic waves travel through in the circuit.

Engineers have developed a new method to compensate for temperature variations in photonic chips. *Credit: Oregon State University.*

Climate-related Financial Risk

In NSF's FY 2023 *Sustainability Report and Implementation Plan*[11] to the Council for Environmental Quality, NSF has established measures to evaluate on a regular cadence as part of external reviews the resilience of major facilities to natural hazards associated with climate change (e.g., fires, flooding, extreme wind, etc.). Formal reviews of facility conditions will now take place once every 5 years. The award recipient will generally conduct the assessments, and the resulting report will be provided to NSF. External panel recommendations will help inform agency decisions around future investments in the supporting infrastructure to reduce risk to the agency and the scientific community. NSF-owned assets in the Arctic and Antarctic are constructed to withstand the harshest environments on Earth, and their conditions are routinely assessed as part of ongoing operations due to the inherent risks. Over time, NSF will consolidate recapitalization needs for the full suite of research infrastructure into a unified plan.

NSF-funded wildfire research helps improve tools and policies for community and industry stakeholders. *Credit: Drone Amplified.*

Just a warm-up: new wildfire interdisciplinary research center studies fire dynamics

The Wildfire Interdisciplinary Research Center (WIRC) at San José State University is an NSF Industry-University Cooperative Research Center that investigates wildfire science. WIRC focuses on fire weather (i.e., fire behavior and how weather leads to fire danger), fire modeling, fire's interaction with climate, and fire remote sensing. In October, WIRC performed a controlled fire burn in steep canyons to determine how fires intensify in canyons due to local weather, such as fire-induced winds, and topography. This was the first canyon wildfire study conducted anywhere in the world. WIRC's Fire Weather Research Laboratory also maintains datasets from all their field research and wildfire deployment, which are available upon request.

[11] NSF's cleared Sustainability Report and Implementation Plans are posted to the Council for Environmental Quality website: https://www.sustainability.gov/contributing-agencies.html.

Performance

NSF's FY 2023 performance results are based on the framework established by the agency's Strategic Plan for FYs 2022–2026: *Leading the World in Discovery and Innovation, STEM Talent Development, and the Delivery of Benefits from Research*.[12] The four strategic goals in this plan reflect four themes—Empower, Discover, Impact, and Excel—and they form the core of the plan. These themes focus on expanding frontiers, engaging people, and delivering solutions. Under each goal are two strategic objectives, which together encompass all areas of agency activity. This goal structure enables NSF to link its investments to longer-term outcomes.

Strategic Goals and Objectives

Strategic Goals	Strategic Objectives
1. Empower: Empower STEM talent to fully participate in science and engineering	**1.1 Ensure accessibility and inclusivity –** Increase the involvement of communities underrepresented in STEM and enhance capacity throughout the Nation.
	1.2 Unleash STEM talent for America – Grow a diverse STEM workforce to advance the progress of science and technology.
2. Discover: Create new knowledge about our universe, our world, and ourselves	**2.1 Advance the frontiers of research –** Accelerate discovery through strategic investments in ideas, people, and infrastructure.
	2.2 Enhance research capacity – Advance the state of the art in research practice.
3. Impact: Benefit society by translating knowledge into solutions	**3.1 Deliver benefits from research –** Advance research and accelerate innovation that addresses societal challenges.
	3.2 Lead globally – Cultivate a global science and engineering community based on shared values and strategic cooperation.
4. Excel: Excel at NSF management and operations	**4.1 Strengthen at speed and scale –** Pursue innovative strategies to strengthen and expand the agency's capacity and capabilities.
	4.2 Invest in people – Attract, empower, and retain a talented and diverse NSF workforce.

In support of Strategic Objective 1.1, Increase the involvement of communities underrepresented in STEM and enhance capacity throughout the Nation, NSF established an Agency Priority Goal for FY 2022–2023 to "Improve representation in the scientific enterprise." The goal has focused on making changes to NSF practices, processes, and policies to foster an increase in proposal submissions from members of groups underrepresented in STEM and from underserved institutions. NSF implemented its approach to this goal through workgroups focused on needed changes in policy, data collection and analysis, engagement with external stakeholders, and internal engagement with NSF staff. The focus of these efforts has been to increase the number and percentage of proposals from groups underrepresented in STEM and from underserved institutions

[12] NSF's Strategic Plan is available at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf22068.

by 10 percent.[13] NSF has made progress against this goal and will be continuing the focus on improving representation in STEM through its FY 2024–2025 Agency Priority Goal.

Progress Toward Achievement of Performance Goals

Each year, NSF issues reports to provide financial management and program performance information to demonstrate accountability to our stakeholders, including the American public. In addition to the AFR, NSF produces the Annual Performance Report.[14] NSF's FY 2023 Annual Performance Report will appear in the *FY 2025 Budget Request to Congress* along with the Annual Performance Plan for FY 2025. This report will provide a complete discussion of NSF's performance measures, including descriptions of the metrics, methodologies, results, and trends. The topic areas of these goals and their FY 2023 targets are listed in the following table. Annual results will be provided in the FY 2023 Annual Performance Report along with information about NSF's verification and validation review of performance data, as required by the Government Performance and Results Modernization Act of 2010.

A California two-spot octopus *(Octopus bimaculoides)* in the Cliff Ragsdale lab at the University of Chicago. *Credit: Robert Kozloff/The University of Chicago.*

Deciphering how octopi cool their brains
Cutting edge research demonstrates that California two spot octopi can adapt to dangerous changes in water temperature by altering their brains. This research, funded by NSF and led by the Marine Biological Laboratory in Woods Hole, Massachusetts, provides novel insight into how the environment can influence genetic information. Like other cephalopods, the California two spot octopus cannot generate its own body heat. By editing their RNA, the messenger molecule between DNA and proteins, octopi can prevent injury by altering the production of neural proteins in response to dangerous temperature drops that can occur during tide, water depth and seasonal changes. This research demonstrates how octopi, and potentially other animals, can adapt and protect themselves from potentially dangerous environmental conditions.

[13] More information on NSF's Agency Priority Goal to "Improve representation in the scientific enterprise," as well as quarterly updates are available at https://www.performance.gov/agencies/nsf/.
[14] These reports are made available on NSF's website as they are completed at: https://new.nsf.gov/about/budget.

FY 2023 Performance Goals

Strategic Objective	Annual Goal Statements
Empower 1.1	Two-year Agency Priority Goal: Improve representation in the scientific enterprise.
Empower 1.2	Increase utilization of the Education and Training Application (ETAP)
Discover 2.1	Major Facility Infrastructure Investments: Ensure program integrity and responsible stewardship of major research facilities and infrastructure.
Discover 2.2	Mid-Scale Infrastructure Investments: Ensure program integrity and responsible stewardship of mid-scale research infrastructure.
Impact 3.1	Grow Partnerships: Increase funding invested from 1) industry and non-profits and 2) other federal agencies that NSF programs leverage to support the science, technology, engineering, and mathematics (STEM) enterprise.
Excel 4.1	Robust and reliable IT services: Ensure availability of IT resources for NSF staff and the broader research community.
Excel 4.2	Human Capital Operating Plan (HCOP): Track progress against NSF's HCOP.
	Culture of Inclusion: Cultivate a workplace environment that proactively supports, engages, and recognizes all members of the workforce.
Cross-cutting	Make Timely Proposal Decisions: Inform applicants whether their proposals have been declined or recommended for funding within 182 days, or six months, of deadline, target, or receipt date, whichever is later.

In addition to these nine annual goals, NSF's FY 2023 Annual Performance Report will also include results for a number of other indicators that relate to NSF's role in these areas. For example, under Objective 1.1, information will be included on NSF funding to Minority-Serving Institutions and to institutions in EPSCoR states and jurisdictions, and under Objective 3.1, information will focus on participation in NSF's I-Corps and SBIR/STTR programs. These additional indicators are intended to foster an understanding of agency performance beyond annual output measures, and this approach draws upon the framework for evidence-based policymaking outlined in the Office of Management and Budget (OMB) guidance.14F[15]

[15] OMB Memorandum M-21-27 "Evidence-Based Policymaking: Learning Agendas and Annual Evaluation Plans" may be accessed at www.whitehouse.gov/wp-content/uploads/2021/06/M-21-27.pdf;
OMB Memorandum M-19-23 "Phase 1 Implementation of the Foundations for Evidence-Based Policymaking Act of 2018: Learning Agendas, Personnel, and Planning Guidance" may be accessed at www.whitehouse.gov/wp-content/uploads/2019/07/M-19-23.pdf.

Renewing NSF

The NSF FY 2022-2026 Strategic Plan emphasized the agency's continued efforts to excel at operations and management to enhance performance of its mission and help contribute to U.S. leadership in research and education across all areas of STEM. In FY 2023, the enterprise-scale reform and process improvement efforts, collectively called Renewing NSF, continued to foster a culture of innovation and collaboration across the agency to implement key operational reforms. Primary outcomes in FY 2023 included the successful acquisition of support services to expand engagement across the agency for continuous assessment and prioritization of evolving reform opportunities; enhancement and maturation of functionality in the Program Suitability and Proposal Concept Tool and agency-wide formalization of the concept outline submission type in the NSF Proposal and Award Policies and Procedures Guide ; migration and upgrade of internal Partnerships guidance and transition of ownership to the TIP directorate; and development and issuance of initial agency-wide implementation of a streamlined post-merit review process for declines, building from the pilot activities completed last year. In addition to these activities, Renewing NSF has served as a strategic partner representing the Office of the Director to support distributed reform activities in IT Innovation Management, Account Management reform, and Project Reporting Compliance and resulting enhancements to internal and customer-facing systems and processes. The focus areas of Renewing NSF remain: (1) making information technology work even better for all; (2) adapting the workforce and the work; (3) streamlining, standardizing, and simplifying processes and practices; and (4) expanding and deepening public and private partnerships.

Credit: NSF.

Revealing hidden patterns in STEM representation
More women, as well as Black, Hispanic, American Indian, and Alaska Native people, have collectively worked in STEM jobs over the past decade, according to NSF's National Center for Science and Engineering Statistics. These gains are diversifying the STEM workforce, and these groups are earning more degrees in science and engineering fields at all levels compared to previous years, according to the Diversity and STEM: Women, Minorities, and Persons with Disabilities 2023 report. In addition to bringing a wide range of ideas, creativity, and skills to these fields, equal access to the STEM workforce is important because those jobs are associated with higher wages and lower unemployment rates—regardless of sex, race, ethnicity, or disability status.

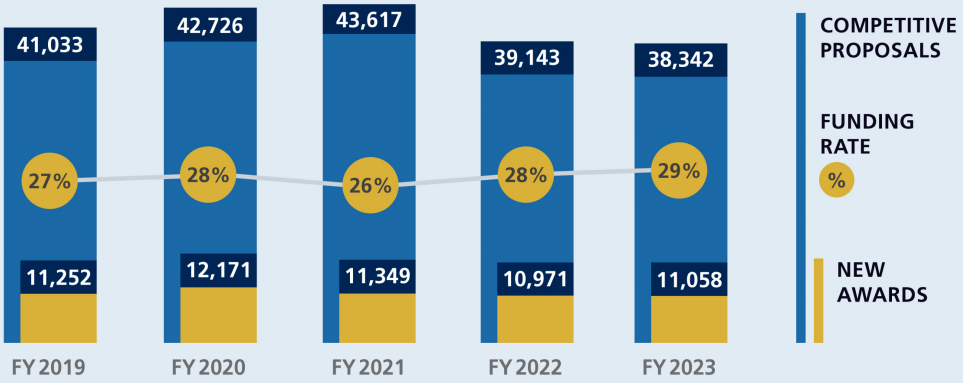
Proposal Workload and Management Trends

NSF continuously monitors key portfolio, proposal workload, and financial measures to understand short- and long-term trends and to help inform management decisions. For an analysis of the long-term trends in competitive proposals, awards, funding rate, and other portfolio metrics, see the *National Science Foundation's Merit Review Process, Fiscal Year 2021 Digest*.[16]

[16] *NSF's Merit Review Process, FY 2021 Digest* (NSB-2023-14) may be accessed at https://www.nsf.gov/nsb/publications/2022/merit_review/nsb202314.pdf

Figure 1.5 identifies three key portfolio measures: competitive proposals acted upon, new awards, and funding rates.

Figure 1.5. Number of NSF Competitive Proposals, New Awards and Funding Rates



Note: New awards are a subset of competitive proposals.

Table 1.1 provides proposal workload and management trends over 5 years. Highlights of these indicators are as follows:

- Between FY 2022 and FY 2023, the number of competitive proposal actions decreased by 2 percent; from 39,143 to 38,342.
- There were 11,058 new awards in FY 2023, a slight increase over FY 2022 new awards (10,971).
- The overall funding rate in FY 2023 was 29 percent, an increase of 1 percentage point. Funding rates differ by directorate and are presented in the agency's annual budget request to Congress.
- The average annual award size of competitive awards was $259,967, approximately $39,000 higher than in FY 2022.
- The number of employees (full-time equivalent [FTEs]) increased between FY 2022 and FY 2023, 1,516 FTE and 1,540 FTE, respectively.
- The number of active awards was about the same in FY 2023: 58,477 compared to 58,384 in FY 2022. The 5-year average number of active awards is over 56,500.
- All NSF awardee institutions are required to submit payment requests at the award level to the NSF Award Cash Management Service (ACM$). Award expenses are posted to the NSF financial system at the time of the payment request. Reliance on ACM$ reduces the burden of manual invoicing and the potential for errors or missed payments.

Table 1.1 Proposal Workload and Management Trends

Measure		FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	Percent Change (FY 2023-FY 2022)	Average (FY 2019-FY 2023)
Portfolio	Competitive proposal actions	41,033	42,726	43,617	39,143	38,342	-2.0%	40,972
	Competitive award actions	11,252	12,171	11,349	10,971	11,058	0.8%	11,360
	Average annual award size (competitive awards)	$197,530	$213,280	$231,202	$220,680	$259,967	17.8%	$224,532
	Funding rate	27%	28%	26%	28%	29%	+1 percentage point	28%
Proposal Workload	Number of employees FTE, usage[1]	1,415	1,421	1,456	1,516	1,540	1.6%	1,470
	Number of active awards[2]	54,093	55,239	56,427	58,384	58,477	0.2%	56,524
	Proposal reviews conducted	192,033	199,526	211,903	187,318	179,958	-3.9%	194,148
Financial	Number of grant payments	20,935	22,169	23,794	27,065	27,426	1.3%	24,278
	Award expenses incurred but not reported at 9/30 ($ in millions)[3]	$425	$437	$461	$457	$466	2.0%	$440

Notes:

[1] FTEs shown include the federal employee workforce for NSF, NSB, OIG, and U.S. Arctic Research Commission.

[2] Active awards include all active awards regardless of whether funds were received during the fiscal year.

[3] FY 2023 number reflects an accrual, and all other years reflect the validated estimate for the fiscal year. This metric does not include accruals for SBIR awards.

Financial Discussion and Analysis

NSF has a strong history of effective and efficient financial operations, consistent with the agency's *Excel* strategic goal: to excel at NSF operations and management. In FY 2023, NSF continued its focus on improvements to financial management processes, systems, and control environment. NSF also continued introducing new and innovative reporting tools that provide the right type of information at the right time. Throughout the year, NSF engaged in various financial management activities that demonstrated its commitment to upholding the highest standards of fiscal stewardship.

- *Reporting Innovations and process improvements*
  - With the implementation of the Quarterly Remittance Memo and dashboard, NSF staff have greater transparency into remittance trends by institution. They can use this information to encourage institutions to switch to more efficient electronic remittance methods. To further encourage efficiencies, NSF has been collaborating with the U.S. Department of the Treasury to develop alternative electronic remittance methods for institutions that cannot use Pay.gov due to internal cash management policies.
  - NSF has launched a new initiative called Grants with no ACM$ Payments (GNAP). This initiative aims to improve monitoring open grant obligations by identifying NSF awards that have not had any financial drawdowns in over a year and notifying institutions of these awards. The backbone of this new initiative is two-pronged: a new dashboard and associated quarterly awardee notifications. GNAP brings increased transparency and data to support effective financial post-award monitoring efforts by both NSF and the awardee institutions. This initiative supplements the existing NSF post-award financial notifications for awards with canceling appropriations and high remaining balances close to award expiration.
- *G-Invoicing:* In FY 2023, NSF implemented G-Invoicing for Orders and Performance. G-Invoicing is a common online platform for federal partners to originate and manage interagency agreements (IAAs) and exchange that data with one another for consistent financial reporting. This implementation strengthens NSF's automation, transparency, and controls over IAA business processes.
- *Enterprise Risk Management (ERM):* NSF's ERM program is vital in promoting a risk-aware culture within the organization and supporting informed decision-making and resource prioritization. In FY 2023, NSF continued to apply the essential ERM concepts of risk appetite and tolerance to its risk profiles, facilitating effective risk assessment, management, and decision-making. NSF's Data Analytics and Assurance Program (DAAP) has also improved risk monitoring by employing innovative analytical tools. To further enhance its ERM capabilities, the agency has expanded its knowledge-sharing and training efforts, developed a program-level risk management guide, and updated risk profile templates. NSF's ERM program has continued to mature each year with sustained guidance by the Chief Operating Officer and participation by ERM Risk Captains from directorates and offices across the agency.

NSF's financial statements received an unmodified audit opinion, indicating they are free from significant errors or misstatements. The internal control program for financial reporting was found to have no material weaknesses or significant deficiencies. You can find the Independent Auditor's Report on the first page of Chapter 2, Financials, followed by management's response.

Understanding the Financial Statements

The following discussion of NSF's financial condition and results of operations should be read together with the FY 2023 financial statements and accompanying notes, found in Chapter 2, Financials, of this AFR.

In accordance with guidance in OMB Circular No. A-136, *Financial Reporting Requirements,* NSF's FY 2023 financial statements and notes are presented in a comparative format to facilitate analysis of FYs 2023 and 2022. Table 1.2 summarizes the changes in NSF's financial position in FY 2023 relative to FY 2022; and explanations of changes for financial statement line items that may be of likely public or congressional interest are provided in the paragraphs below the table.

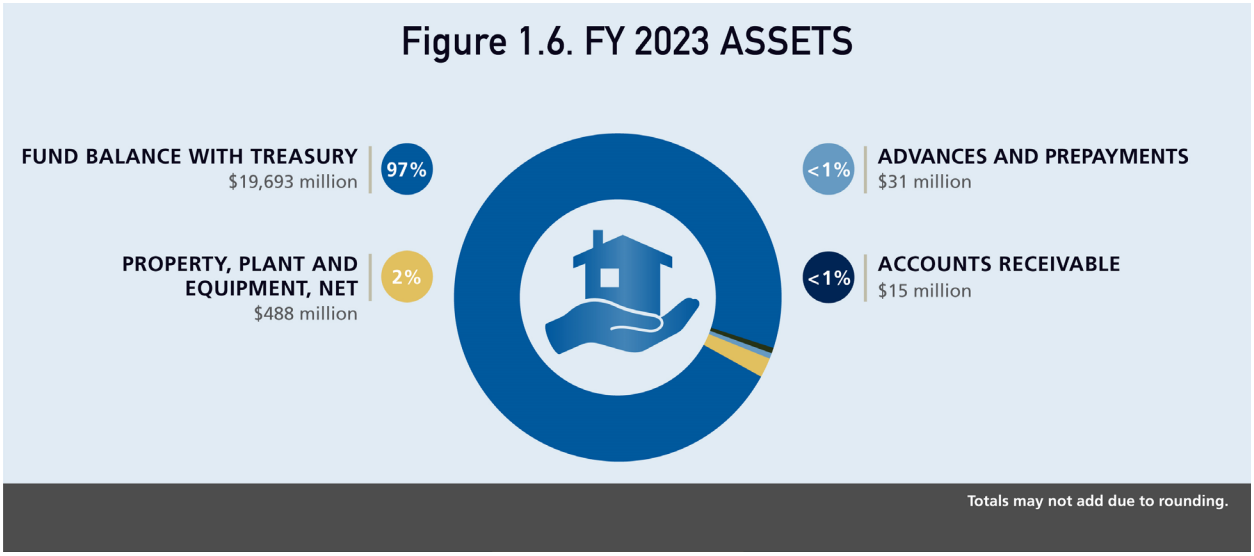
Table 1.2 – Changes in NSF's Financial Position in FY 2023

(Dollars in Millions)

Financial Categories	FY 2023	FY 2022	Dollar Change	Percentage Change
Assets	$20,227	$19,233	$994	5%
Liabilities	$830	$796	$34	4%
Net Position	$19,397	$18,438	$959	5%
Net Cost	$9,029	$8,190	$839	10%
Budgetary Resources	$11,075	$10,217	$858	8%

Balance Sheet

The Balance Sheet presents the total amounts available for use by NSF (assets) against the amounts owed (liabilities) and amounts that comprise the difference (net position). In FY 2023, *Assets* (Figure 1.6) increased $994 million (5 percent) from FY 2022. Most of the change occurred in the *Fund Balance with Treasury* line, which increased $982 million (5 percent) in FY 2023. NSF is authorized to use *Fund Balance with Treasury* to make expenditures and pay amounts due through the disbursement authority of Treasury. The *Fund Balance with Treasury* is increased through appropriations and collections and decreased expenditures and rescissions.



In FY 2023, *Liabilities* (Figure 1.7) increased $34 million (4 percent) over the *Liabilities* reported in FY 2022. Driving this change was a $32 million net increase in *Accounts Payable.* In FY 2023, *Accounts Payable (Intragovernmental)* decreased $5 million while *Accounts Payable (Other Than Intragovernmental)* increased $37 million due to a larger non-federal accounts payable accrual recorded at year-end. *Accounts Payable (Other Than Intragovernmental)* is estimated annually by utilizing historical data based on the actual expenses incurred but not reported as a percentage of current fiscal year expenses. NSF determines *Accounts Payable (Intragovernmental)* by performing outreach to its federal trading partners and recording offsetting payables for any reported trading partner *Accounts Receivable*.

Figure 1.7. FY 2023 LIABILITIES

ACCRUED GRANT LIABILITIES
$533 million
64%

ACCOUNTS PAYABLE
$170 million
20%

LIABILITY FOR NON-FIDUCIARY DEPOSIT FUNDS AND UNDEPOSITED COLLECTIONS
$71 million
9%

3%
FEDERAL EMPLOYEE BENEFITS PAYABLE
$29 million

1%
ENVIRONMENTAL AND DISPOSABLE LIABILITIES
$12 million

1%
OTHER LIABILITIES (INTRAGOVERNMENTAL)
$10 million

1%
ACCRUED PAYROLL
$5 million

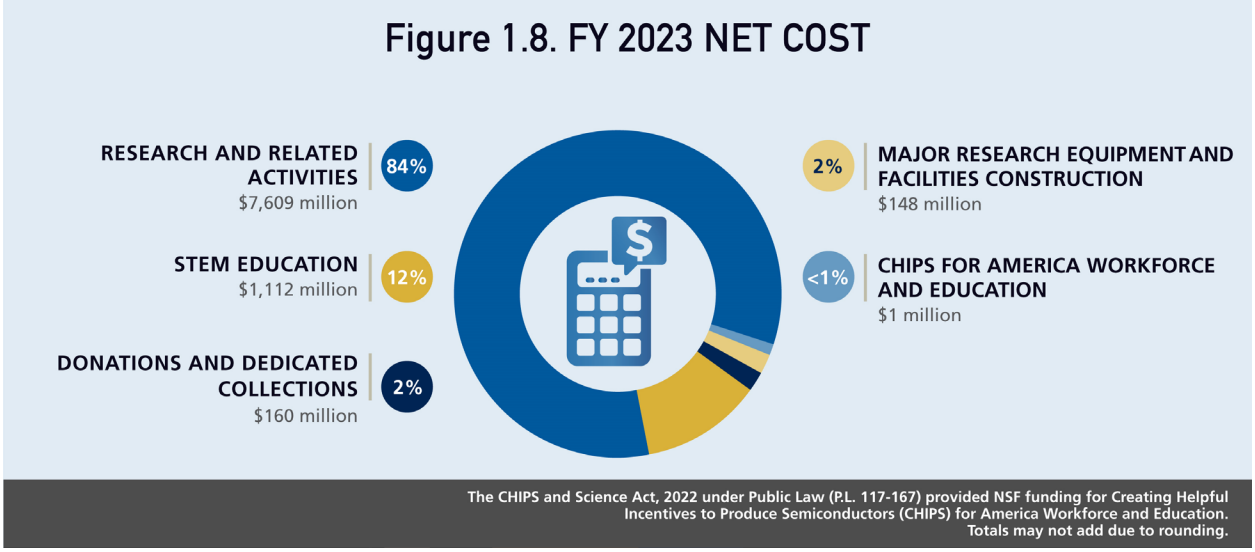
Other Liabilities (Intragovernmental) includes *Advances from Others and Deferred Revenue.*
Totals may not add due to rounding.

Statement of Net Cost

The Statement of Net Cost presents the annual cost of operating NSF programs. The net cost of operations of each NSF program equals the program's gross cost less any offsetting earned revenue. Intragovernmental earned revenues are recognized when related program or administrative expenses are incurred. Earned revenue is deducted from the full cost of the programs to arrive at the *Net Cost of Operations*.

Approximately 95 percent of FY 2023 *Net Cost of Operations* (Figure 1.8) was directly related to the support of R&RA, EDU, MREFC, CHIPS for America Workforce and Education, and Donations and Dedicated Collections. Additional costs were incurred for indirect general operation activities (e.g., salaries, training, and activities related to the advancement of NSF information systems technology) and activities of the NSB and the OIG. These costs were allocated to the R&RA, EDU, MREFC, CHIPS for America Workforce and Education, and Donations and Dedicated Collections programs and account for approximately 5 percent of FY 2023 *Net Cost of Operations*. These administrative and management activities support the agency's program goals.

In FY 2023, *Net Costs* related to the Coronavirus Aid, Relief, and Economic Security (CARES) Act (2020) and American Rescue Plan (ARP) (2021) for R&RA, EDU, and MREFC were $146 million, $14 million, and $28 million, respectively.



Statement of Changes in Net Position

The Statement of Changes in Net Position presents the agency's cumulative results of operations and unexpended appropriations for the fiscal year. In FY 2023, NSF's *Unexpended Appropriations* increased $941 million from FY 2022 and NSF's *Cumulative Results of Operations* increased $18 million, for a total increase in *Net Position* of $959 million.

CARES and ARP funding resulted in Unexpended Appropriations of $2 million and $293 million, respectively. As NSF continues to provide support for COVID-19 related research, costs will increase, which will lead to a decrease in net position.

Statement of Budgetary Resources

The Statement of Budgetary Resources provides information on how budgetary resources were made available to NSF for the year and the status of those budgetary resources at year-end. For FY 2023, *Total Budgetary Resources* increased $857 million from the FY 2022 level. *Budgetary Resources—Appropriations* in FY 2023 for the R&RA, EDU, MREFC, and CHIPS for America Workforce and Education programs were $7,842 million, $1,371 million, $187 million, and $25 million, respectively. The combined *Budgetary Resources—Appropriations* in FY 2023 for the NSB, the OIG, and AOAM accounts totaled $476 million. NSF also received $138 million of funding via warrant from the Nonimmigrant Petitioner Account (H-1B) and $28 million of donations from private companies, academic institutions, nonprofit foundations, and individuals.

Limitations of the Financial Statements

The financial statements are prepared to report the financial position, financial condition, and results of operations, consistent with the requirements of 31 U.S.Code § 3515(b). The statements are prepared from records of federal entities in accordance with federal generally accepted accounting principles (GAAP) and the formats prescribed by OMB. Reports used to monitor and control budgetary resources are prepared from the same records. Users of the statements are advised that the statements are for a component of the U.S. Government.

Analysis of Systems, Controls, and Legal Compliance

Management Assurances

The Federal Managers' Financial Integrity Act of 1982 (FMFIA)[17] and the OMB Circular A-123, Management's Responsibility for Enterprise Risk Management and Internal Control,[18] require NSF to evaluate annually the effectiveness of agency internal controls and provide reasonable assurance to the President and the Congress on control system adequacy.

NSF assures its internal control system supports a mature, agile, and sustainable control environment. This proactive approach supports effective governance and oversight informed by internal and external risk. A strong risk-based framework ensures focus on the most consequential management issues and confidence that operations function as intended. The risk-based approach also supports a maturing ERM program.

National Science Foundation

FY 2023 Statement of Assurance

The National Science Foundation (NSF) management is responsible for managing risks and maintaining effective internal control to meet the objectives of Sections 2 and 4 of the *Federal Managers' Financial Integrity Act* (FMFIA).

NSF conducted its assessment of risk and internal control processes in accordance with OMB Circular No. A-123, *Management's Responsibility for Enterprise Risk Management and Internal Control*. Based on the results of the assessment, NSF can provide reasonable assurance that internal control over operations, reporting, and compliance was operating effectively as of September 30, 2023.

/s/
Sethuraman Panchanathan
Director

November 14, 2023

The FY 2023 unmodified Statement of Assurance, with no material weaknesses, provides reasonable assurance as to the overall adequacy and effectiveness of internal controls based upon information that the system of internal control is operating efficiently and effectively.

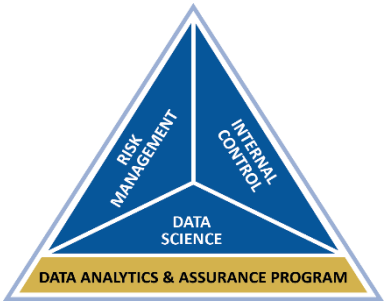
NSF's internal control assessment provides reasonable assurance that the objectives of FMFIA and the Federal Financial Management Improvement Act of 1996 (FFMIA) were achieved and that the internal control process over financial reporting is effective.

17 FMFIA can be accessed at: https://www.congress.gov/bill/97th-congress/house-bill/1526/text
18 OMB Circular A-123 can be accessed at: https://obamawhitehouse.archives.gov/sites/default/files/omb/memoranda/2016/m-16-17.pdf

Highlights from NSF's FY 2023 Data Analytics and Assurance Program (DAAP)

NSF's DAAP adapts knowledge sharing for ERM and internal control risks leveraged by data science and innovative technology to continuously improve the effectiveness of risk monitoring. The DAAP supports the NSF mission by:

- Dealing with the proliferation of data.
- Leveraging artificial intelligence and automation.
- Targeting and reducing the cost of compliance efforts.
- Strengthening management decision-making.



The DAAP's areas of focus for FY 2023 were as follows:
ERM – NSF continued to mature its ERM program in alignment with risk management standards issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) ERM Integrated Framework. Efforts included engaging directorates on addressing program-level risks and developing ERM guidance and data science products to support monitoring and analyzing agency risk.

Internal Control – Oversight of NSF's internal controls over financial reporting was conducted to evaluate program integrity in accordance with OMB Circular A-123, the Green Book, and COSO's Internal Control Integrated Framework and Internal Control Over Financial Reporting Compendium of Approaches and Examples through the following key activities:

- Assessed internal control entity-level controls
- Conducted Biannual Risk and Control Checkpoints related to key risk areas
- Conducted internal control over financial reporting risk assessment through testing and modernizing the control environment
- Developed initial inventory of existing fraud risk prevention and detection activities to inform NSF's triennial improper payments risk assessment in FY 2024
- Provided support for the validation of the grant accrual
- Completed IT General Controls assessment
- Supported the Statement of Standards for Attestation Engagements (SSAE 18) review cycle.

In addition, the DAAP monitors internal controls over compliance, including: the *Anti-Deficiency Act; Digital Accountability and Transparency Act; Government Charge Card Abuse Prevention Act; Federal Information Security Modernization Act Management Act; Federal Financial Management Improvement Act; Single Audit Act,* and other requirements applicable to internal control.

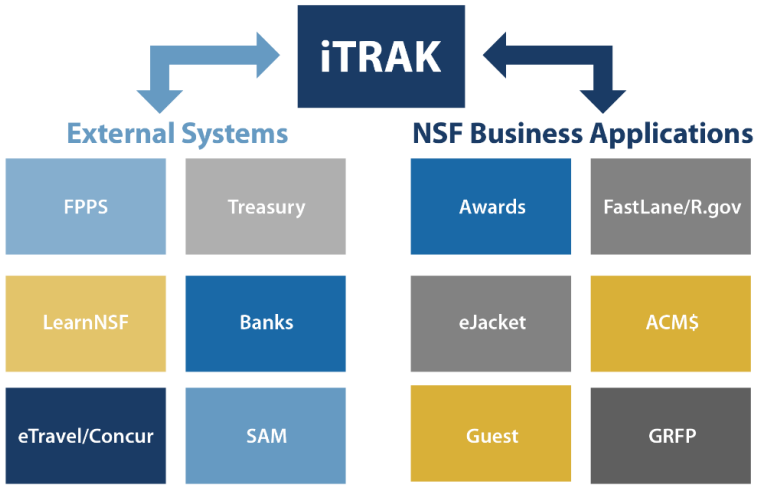
Financial Management Systems

NSF's financial management system, iTRAK (Figure 1.6), is NSF's Oracle-based, commercial-off-the-shelf financial system and is hosted off-premises in a cloud environment. In compliance with FMFIA, FFMIA, and other federal requirements, iTRAK provides automated business processes, funds control management, and financial reporting capabilities for NSF's external and internal customers, including grantees, financial and administrative staff, and program managers. iTRAK also performs

system edit checks and provides an audit trail for financial transactions, thereby strengthening internal controls. By enabling efficient and effective execution of financial activities and business operations, iTRAK's service provider provides NSF assurance for its financial system through service provider audits (more technically referred to as SSAE No. 18) at the application, platform, and infrastructure levels. All three levels received unmodified audit opinions (i.e., clean) for FY 2023.

In FY 2023, NSF continued planning for the next generation financial system and will continue enhancing iTRAK's functional and technical capabilities to streamline operations and comply with emerging cybersecurity requirements and other federal mandates.

Figure 1.9—NSF Financial Management System Framework



iTRAK supports the agency's stewardship role by providing managers and staff with financial data and reports to aid in data analysis so they can make informed decisions about the programs they manage and support. iTRAK interfaces with NSF's awards, grants management, and business systems including:

- Award Cash Management Service (ACM$).
- MyNSF Awards (Awards) — NSF's award and award amendment processing, approval, and notification system.
- eJacket — NSF's internal proposal processing system, post-award request tracking and approval system, and document repository.
- Research.gov — Website for the research community that provides quick access to research information and grants management services. Research.gov will replace FastLane.
- Graduate Research Fellowship Program (GRFP) System.
- Guest Travel and Reimbursement System (Guest).

iTRAK also interfaces with external systems operated by Treasury, Citibank, and LearnNSF, the Foundation's training system, and other federal systems such as the Federal Personnel Payroll System (FPPS), eTravel/Concur, and the General Services Administration's System for Award Management.

Chapter 2
Financials

MEMORANDUM

DATE: November 14, 2023

TO: Dr. Dan Reed
Chair
National Science Board

Dr. Sethuraman Panchanathan
Director
National Science Foundation

FROM: Allison C. Lerner
Inspector General

SUBJECT: Audit Report No. 23-2-002, *Audit of the National Science Foundation's Fiscal Years 2023 and 2022 Financial Statements*

This memorandum transmits the Kearney & Company, P.C.'s reports on its financial statement audit of the National Science Foundation (NSF) for FY 2023, which includes FY 2022 comparative information.

Audit Reports on Financial Statements; Internal Control over Financial Reporting; and Compliance with Laws, Regulations, Contracts, and Grant Agreements

The *Chief Financial Officers Act of 1990* (CFO Act, Pub. L. No. 101-576), as amended, requires that NSF's Inspector General or an independent external auditor, as determined by the Inspector General, audit NSF's financial statements in accordance with *Government Auditing Standards* (GAS) issued by the Comptroller General of the United States. We contracted with the independent certified public accounting firm Kearney & Company, P.C. (Kearney) to audit NSF's financial statements as of September 30, 2023, and for the fiscal year then ended. The contract requires that the audit be performed in accordance with GAS; Office of Management and Budget Bulletin 24-01, *Audit Requirements for Federal Financial Statements*; and the U.S. Government Accountability Office/Council of the Inspectors General on Integrity and Efficiency *Financial Audit Manual*. For FY 2023, Kearney provided: (1) its opinion on the financial statements, (2) a report on internal control over financial reporting, and (3) a report on compliance with laws, regulations, contracts, and grant agreements. In its audit of NSF, Kearney:

- Found that the financial statements referred to above present fairly, in all material respects, the financial position of NSF as of September 30, 2023 and 2022, and its net cost of operations, changes in net position, and budgetary resources for the years then ended, in accordance with accounting principles generally accepted in the United States of America.

- Identified no material weaknesses in internal control over financial reporting.[1]
- Identified no instances in which NSF's financial management systems did not substantially comply with the *Federal Financial Management Improvement Act of 1996* (FFMIA, Pub. L. No. 104-208).
- Identified no reportable instances of noncompliance with provisions of laws, regulations, contracts, and grant agreements tested or other matters.

NSF's response to the draft reports, dated November 14, 2023, follows Kearney's reports.

Kearney is responsible for the attached auditor's reports dated November 14, 2023, and the conclusions expressed therein. We do not express opinions on NSF's financial statements or internal control over financial reporting or on whether NSF's financial management systems substantially complied with the requirements of FFMIA, or conclusions on compliance and other matters.

Kearney's Independent Auditor's Report is meant only to be distributed and read as part of the Agency Financial Report (AFR).

We thank your staff for the assistance that was extended to the auditors during this audit. If you have any questions regarding this report, please contact Theresa S. Hull, Assistant Inspector General, Office of Audits, at 703-292-7100 or OIGpublicaffairs@nsf.gov.

[1] A material weakness is a deficiency, or combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented or detected and corrected on a timely basis.

KEARNEY& COMPANY

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INDEPENDENT AUDITOR'S REPORT

To the Director and Inspector General of the National Science Foundation

Report on the Audit of the Financial Statements

Opinion

We have audited the financial statements of the National Science Foundation (NSF), which comprise the Balance Sheets as of September 30, 2023 and 2022, the related Statements of Net Cost and Changes in Net Position, and the combined Statements of Budgetary Resources (hereinafter referred to as the "financial statements") for the years then ended, and the related notes to the financial statements.

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the NSF as of September 30, 2023 and 2022 and its net cost of operations, changes in net position, and budgetary resources for the years then ended in accordance with accounting principles generally accepted in the United States of America.

Basis for Opinion

We conducted our audits in accordance with auditing standards generally accepted in the United States of America; the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States; and Office of Management and Budget (OMB) Bulletin No. 24-01, *Audit Requirements for Federal Financial Statements*. Our responsibilities under those standards are further described in the ***Auditor's Responsibilities for the Audit of the Financial Statements*** section of our report. We are required to be independent of the NSF and to meet our other ethical responsibilities in accordance with the relevant ethical requirements relating to our audits. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Responsibilities of Management for the Financial Statements

Management is responsible for: 1) the preparation and fair presentation of the financial statements in accordance with accounting principles generally accepted in the United States of America; 2) the preparation, measurement, and presentation of Required Supplementary Information (RSI) in accordance with U.S. generally accepted accounting principles; 3) the preparation and presentation of Other Information included in the NSF's Agency Financial Report (AFR), as well as ensuring the consistency of that information with the audited financial statements and the RSI; and 4) the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the NSF's ability to continue as a going concern for a reasonable period of time beyond the financial statement date.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements, as a whole, are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance but is not absolute assurance and, therefore, is not a guarantee that an audit conducted in accordance with *Government Auditing Standards* will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the financial statements.

In performing an audit in accordance with *Government Auditing Standards*, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit
- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the NSF's internal control. Accordingly, no such opinion is expressed
- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements
- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the NSF's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control-related matters that we identified during the audit.

RSI

Accounting principles generally accepted in the United States of America require that Management's Discussion and Analysis, Deferred Maintenance and Repairs, Combining Statement of Budgetary Resources by Major Budget Accounts, and other RSI be presented to supplement the financial statements. Such information is the responsibility of management and, although not a part of the basic financial statements, is required by OMB and the Federal Accounting Standards Advisory Board (FASAB), who consider it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the RSI in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management regarding the methods of preparing the information and comparing it for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audits of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Other Information

Management is responsible for the Other Information included in the AFR. The Other Information comprises the Summary of Financial Statement Audit and Management Assurances, Management Challenges, Payment Integrity Reporting, Fraud Reduction Report, Undisbursed Balances in Expired Grants Accounts, Grant Oversight and New Efficiency Act Requirements, Reduce the Footprint, Awards to Affiliated Institutions, Awards to Assistant Director Intergovernmental Personnel Act's Home Institutions, and Patents and Inventions Resulting from NSF Support, but does not include the financial statements and our auditor's report thereon. Our opinion on the financial statements does not cover the Other Information, and we do not express an opinion or any form of assurance thereon.

In connection with our audits of the financial statements, our responsibility is to read the Other Information and consider whether a material inconsistency exists between the Other Information and the financial statements or the Other Information otherwise appears to be materially misstated. If, based on the work performed, we conclude that an uncorrected material misstatement of the Other Information exists, we are required to describe it in our report.

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Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards* and OMB Bulletin No. 24-01, we have also issued reports, dated November 14, 2023, on our consideration of the NSF's internal control over financial reporting and on our tests of the NSF's compliance with provisions of applicable laws, regulations, contracts, and grant agreements, as well as other matters for the year ended September 30, 2023. The purpose of those reports is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing and not to provide an opinion on internal control over financial reporting or on compliance and other matters. Those reports are an integral part of an audit performed in accordance with *Government Auditing Standards* and OMB Bulletin No. 24-01 and should be considered in assessing the results of our audits.

Alexandria, Virginia
November 14, 2023

KEARNEY& COMPANY

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INDEPENDENT AUDITOR'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

To the Director and Inspector General of the National Science Foundation

We have audited, in accordance with auditing standards generally accepted in the United States of America; the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States; and Office of Management and Budget (OMB) Bulletin No. 24-01, *Audit Requirements for Federal Financial Statements*, the financial statements of the National Science Foundation (NSF) as of and for the year ended September 30, 2023; and the related notes to the financial statements, which collectively comprise the NSF's basic financial statements, and we have issued our report thereon dated November 14, 2023.

Report on Internal Control over Financial Reporting

In planning and performing our audit of the financial statements, we considered the NSF's internal control over financial reporting (internal control) as a basis for designing audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the NSF's internal control. Accordingly, we do not express an opinion on the effectiveness of the NSF's internal control. We limited our internal control testing to those controls necessary to achieve the objectives described in OMB Bulletin No. 24-01. We did not test all internal controls relevant to operating objectives as broadly defined by the Federal Managers' Financial Integrity Act of 1982 (FMFIA), such as those controls relevant to ensuring efficient operations.

A *deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A *material weakness* is a deficiency, or combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected, on a timely basis. A *significant deficiency* is a deficiency, or combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies. Given these limitations, during our audit, we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses may exist that have not been identified.

We noted certain additional matters involving internal control over financial reporting that we will report to the NSF's management in a separate letter.

KEARNEY& COMPANY

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of internal control and the results of that testing, and not to provide an opinion on the effectiveness of the NSF's internal control. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* and OMB Bulletin No. 24-01 in considering the entity's internal control. Accordingly, this report is not suitable for any other purpose.

Alexandria, Virginia
November 14, 2023

KEARNEY&
COMPANY

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INDEPENDENT AUDITOR'S REPORT ON COMPLIANCE WITH LAWS, REGULATIONS, CONTRACTS, AND GRANT AGREEMENTS

To the Director and Inspector General of National Science Foundation

We have audited, in accordance with auditing standards generally accepted in the United States of America, the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States; Office of Management and Budget (OMB) Bulletin No. 24-01, *Audit Requirements for Federal Financial Statements*; the financial statements of the National Science Foundation (NSF) as of and for the year ended September 30, 2023; and the related notes to the financial statements, which collectively comprise the NSF's basic financial statements, and we have issued our report thereon dated November 14, 2023.

Report on Compliance and Other Matters

As part of obtaining reasonable assurance about whether the NSF's financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the determination of the financial statement, and provisions referred to in Section 803(a) of the Federal Financial Management Improvement Act of 1996 (FFMIA). We limited our tests of compliance to these provisions and did not test compliance with all laws, regulations, contracts, and grant agreements applicable to the NSF. However, providing an opinion on compliance with those provisions was not an objective of our audit; accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards* and OMB Bulletin No. 24-01.

The results of our tests of compliance with FFMIA disclosed no instances in which the NSF's financial management systems did not comply substantially with the Federal financial management system's requirements, applicable Federal accounting standards, or application of the United States Standard General Ledger at the transaction level.

KEARNEY& COMPANY

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of compliance and the results of that testing, and not to provide an opinion on the effectiveness of the entity's compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* and OMB Bulletin No. 24-01 in considering the entity's compliance. Accordingly, this report is not suitable for any other purpose.

Alexandria, Virginia
November 14, 2023

Attachment I –

National Science Foundation's Management Response

National Science Foundation
Office of Budget, Finance & Award Management

M E M O R A N D U M

Date: November 14, 2023

To: Allison Lerner, Inspector General

From: Janis Coughlin-Piester
Office Head and Chief Financial Officer
Office of Budget, Finance, and Award Management

Subject: Management's Response to Independent Auditor's Report for Fiscal Year (FY) 2023

I am pleased that the Independent Public Auditor's Report on the FY 2023 financial statements has resulted in an unmodified opinion. This is a significant achievement that showcases the flexibility and expertise of NSF's staff in successfully navigating challenges while upholding the highest standards of financial stewardship. I appreciate the innovation and professionalism that your staff and Kearney & Company have demonstrated during the audit. The strong foundation of cooperation established, together with constructive audit input, has facilitated NSF's progress in achieving excellent audit results.

We look forward to working with the Office of Inspector General and Kearney in future audits. If you have any questions or require additional information, please contact Mike Wetklow, Deputy Chief Financial Officer and Division Director for Financial Management, at mwetklow@nsf.gov.

National Science Foundation

FINANCIAL STATEMENTS

As of and for the Fiscal Years ended
September 30, 2023 and 2022

National Science Foundation
Balance Sheet
As of September 30, 2023 and 2022
(Amounts in Thousands)

Assets	**2023**	**2022**
Intragovernmental Assets		
Fund Balance With Treasury (Note 2)	$ 19,692,930	$ 18,711,159
Accounts Receivable, Net		
Assets for Custodial and Non-Entity Liabilities - Other Than the General Fund of the US Government (Note 7)	7,692	10,827
Accounts Receivable, Net	6,149	6,782
Total Accounts Receivable, Net	13,841	17,609
Advances and Prepayments (Note 8B)	30,679	24,144
Total Intragovernmental Assets	19,737,450	18,752,912
Other Than Intragovernmental Assets		
Cash and Other Monetary Assets	92	25
Accounts Receivable, Net	1,577	2,426
Property, Plant, and Equipment, Net (Note 3)	488,074	477,798
Total Other Than Intragovernmental Assets	489,743	480,249
Total Assets	**$ 20,227,193**	**$ 19,233,161**
Liabilities		
Intragovernmental Liabilities		
Accounts Payable		
Accounts Payable	$ 56,280	$ 61,120
Total Accounts Payable	56,280	61,120
Advances from Others and Deferred Revenue	2,215	-
Other Liabilities		
Other Liabilities (Without Reciprocals)	2,485	2,428
Liability to the General Fund of US Government - for Custodial and Other Non-Entity Assets	1,545	2,037
Other Current Liabilities - Benefit Contributions Payable	1,337	1,399
Other Liabilities - Reimbursable Activities	2,271	2,526
Total Other Liabilities	7,638	8,390
Total Intragovernmental Liabilities	66,133	69,510
Other Than Intragovernmental Liabilities		
Accounts Payable	113,285	76,386
Federal Employee Benefits Payable	29,063	27,748
Environmental and Disposal Liabilities (Note 6)	12,342	13,139
Other Liabilities		
Accrued Grant Liabilities	533,495	524,199
Accrued Payroll	5,242	5,105
Liability for Non-Fiduciary Deposit Funds and Undeposited Collections (Note 2)	70,836	79,442
Total Other Liabilities	609,573	608,746
Total Other Than Intragovernmental Liabilities	764,263	726,019
Total Liabilities	**$ 830,396**	**$ 795,529**

Net Position		
Unexpended Appropriations		
Unexpended Appropriations - Funds from Other Than Dedicated Collections	$ 18,190,172	$ 17,249,150
Total Unexpended Appropriations	18,190,172	17,249,150
Cumulative Results of Operations		
Cumulative Results of Operations - Funds from Dedicated Collections (Note 7)	703,470	715,947
Cumulative Results of Operations - Funds from Other Than Dedicated Collections	503,155	472,535
Total Cumulative Results of Operations	1,206,625	1,188,482
Total Net Position	**$ 19,396,797**	**$ 18,437,632**
Total Liabilities and Net Position	**$ 20,227,193**	**$ 19,233,161**

The accompanying notes are an integral part of these statements.

National Science Foundation
Statement of Net Cost
For the Fiscal Years Ended September 30, 2023 and 2022
(Amounts in Thousands)

Program Costs	**2023 (Note 12)**	**2022**
Research and Related Activities		
Gross Costs	$ 7,728,989	$ 7,076,948
Less: Earned Revenue	(120,476)	(92,339)
Net Research and Related Activities	**$ 7,608,513**	**$ 6,984,609**
STEM Education		
Gross Costs	$ 1,118,744	$ 921,660
Less: Earned Revenue	(6,837)	(6,131)
Net STEM Education	**$ 1,111,907**	**$ 915,529**
Major Research Equipment and Facilities Construction		
Gross Costs	$ 147,704	$ 149,567
Less: Earned Revenue	-	-
Net Major Research Equipment and Facilities Construction	**$ 147,704**	**$ 149,567**
CHIPS for America Workforce and Education		
Gross Costs	$ 840	$ -
Less: Earned Revenue	-	-
Net CHIPS for America Workforce and Education	**$ 840**	$ -
Donations and Dedicated Collections		
Gross Costs	$ 160,257	$ 140,556
Less: Earned Revenue	-	-
Net Donations and Dedicated Collections	**$ 160,257**	**$ 140,556**
Net Cost of Operations (Note 10)	**$ 9,029,221**	**$ 8,190,261**

The accompanying notes are an integral part of these statements.

National Science Foundation
Statement of Changes in Net Position
For the Fiscal Year Ended September 30, 2023
(Amounts in Thousands)

	2023		
	Funds from Dedicated Collections (Notes 7 & 12)	**Funds from Other Than Dedicated Collections (Note 12)**	**Total (Note 12)**
Unexpended Appropriations			
Beginning Balances	$ -	**$ 17,249,150**	**$ 17,249,150**
Appropriations Received	-	9,901,511	9,901,511
Other Adjustments (Canceled Authority)		(94,626)	(94,626)
Appropriations Used	- -	(8,865,863)	(8,865,863)
Net Change in Unexpended Appropriations	**-**	**941,022**	**941,022**
Total Unexpended Appropriations	**$ -**	**$ 18,190,172**	**$ 18,190,172**
Cumulative Results of Operations			
Beginning Balances	**$ 715,947**	**$ 472,535**	**$ 1,188,482**
Adjustments			
Change in Accounting Principle	-	-	-
Beginning Balances, Adjusted	**715,947**	**472,535**	**1,188,482**
Appropriations Used	-	8,865,863	8,865,863
Non-Exchange Revenue	-	3	3
Donations (Note 10)	-	27,743	27,743
Transfers In / (Out) Without Reimbursement	134,939	-	134,939
Imputed Financing (Note 10)	-	22,099	22,099
Other	-	(3,283)	(3,283)
Net Cost of Operations (Note 10)	(147,416)	(8,881,805)	(9,029,221)
Net Change in Cumulative Results of Operations	**(12,477)**	**30,620**	**18,143**
Total Cumulative Results of Operations	**$ 703,470**	**$ 503,155**	**$ 1,206,625**
Net Position	**$ 703,470**	**$ 18,693,327**	**$ 19,396,797**

The accompanying notes are an integral part of these statements.

National Science Foundation
Statement of Changes in Net Position
For the Fiscal Year Ended September 30, 2022
(Amounts in Thousands)

	2022		
	Funds From Dedicated Collections (Note 7)	Funds from Other Than Dedicated Collections	Total
Unexpended Appropriations			
Beginning Balances	**$ -**	**$ 16,561,541**	**$ 16,561,541**
Appropriations Received	-	8,863,000	8,863,000
Other Adjustments (Canceled Authority)	-	(87,830)	(87,830)
Appropriations Used	-	(8,087,561)	(8,087,561)
Net Change in Unexpended Appropriations	**-**	**687,609**	**687,609**
Total Unexpended Appropriations	**$ -**	**$ 17,249,150**	**$ 17,249,150**
Cumulative Results of Operations			
Beginning Balances	**$ 657,863**	**$ 464,243**	**$ 1,122,106**
Adjustments			
Change in Accounting Principle	-	(48,717)	(48,717)
Beginning Balances, Adjusted	**657,863**	**415,526**	**1,073,389**
Appropriations Used	-	8,087,561	8,087,561
Non-Exchange Revenue	-	9	9
Donations (Note 10)	-	20,230	20,230
Transfers In / (Out) Without Reimbursement	189,940	2	189,942
Imputed Financing (Note 10)	-	14,439	14,439
Other	-	(6,827)	(6,827)
Net Cost of Operations (Note 10)	(131,856)	(8,058,405)	(8,190,261)
Net Change in Cumulative Results of Operations	**58,084**	**57,009**	**115,093**
Total Cumulative Results of Operations	**$ 715,947**	**$ 472,535**	**$ 1,188,482**
Net Position	**$ 715,947**	**$ 17,721,685**	**$ 18,437,632**

The accompanying notes are an integral part of these statements.

National Science Foundation
Statement of Budgetary Resources
For the Fiscal Years Ended September 30, 2023 and 2022
(Amounts in Thousands)

	2023	2022
Budgetary Resources		
Unobligated Balance from Prior Year Budget Authority, Net	$ 874,793	$ 1,054,941
Appropriations	10,067,328	9,071,091
Spending Authority from Offsetting Collections	132,585	91,462
Total Budgetary Resources (Note 8C)	**$ 11,074,706**	**$ 10,217,494**
Status of Budgetary Resources		
New Obligations and Upward Adjustments (Note 8C)	$ 9,861,960	$ 9,523,708
Unobligated Balance, End of Period		
Apportioned, Unexpired (Note 2)	781,785	326,625
Unapportioned, Unexpired (Note 2)	222,712	183,877
Unobligated Balance, Unexpired, End of Period	1,004,497	510,502
Unobligated Balance, Expired, End of Period (Note 2)	208,249	183,284
Total Unobligated Balance, End of Period	1,212,746	693,786
Total Status of Budgetary Resources	**$ 11,074,706**	**$ 10,217,494**
Net Outlays (Notes 8C & 10)		
Net Outlays	$ 8,982,258	$ 8,159,356
Distributed Offsetting Receipts	(31,489)	(26,554)
Net Agency Outlays	**$ 8,950,769**	**$ 8,132,802**

The accompanying notes are an integral part of these statements.

NOTES TO THE PRINCIPAL FINANCIAL STATEMENTS

Note 1. Summary of Significant Accounting Policies

A. Reporting Entity

The National Science Foundation (NSF or "Foundation") is an independent federal agency created by the National Science Foundation Act of 1950, as amended (42 United States Code (U.S.C.) 1861-75). Its primary mission is to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense. NSF initiates and supports scientific research and research fundamental to the engineering process and programs to strengthen the Nation's science and engineering potential. NSF also supports critical education programs in science, technology, engineering, and mathematics (STEM) fields, which help prepare future generations of scientists and engineers. NSF funds research and education in science and engineering by awarding grants and contracts to educational and research institutions throughout the United States (U.S.) and its territories. NSF, by law, cannot operate research facilities except in the polar regions. NSF enters into relationships through awards to fund the research operations conducted by grantees. Information on NSF funding by institution can be found at https://wwwkc.fiscal.treasury.gov/files/reports-statements/combined-statement/cs2022/2022-cs-final.pdf.

NSF is led by a presidentially-appointed, Senate-confirmed Director and a 24-member National Science Board (NSB). As of September 30, 2023, there were 25 members serving on the NSB, including the Director. The NSB members represent a cross section of prominent leaders in science and engineering research and education, and are appointed by the President for 6-year terms. The NSF Director is an ex officio member of the Board. The NSF workforce, including staff in the NSB Office and the Office of the Inspector General, is comprised of approximately 1,500 federal employees and 200 scientists from research institutions in temporary positions. NSF provides the opportunity for scientists, engineers, and educators to join the Foundation as temporary program directors and advisors. These "rotators" provide input during the merit review process of proposals; provide insight for new directions in the fields of science, engineering, and education; and support cutting-edge interdisciplinary research. Rotators can come to NSF under multiple mechanisms. The largest numbers come from Intergovernmental Personnel Act (IPA) assignments and remain employees of their home institutions. NSF facilitates IPA assignments through grants to their institution as a reimbursement in whole or in part for salary and benefits, and that reimbursement is then paid by the institution to their employee. All rotators are subject to criminal conflict of interest statutes as well as the government-wide *Standards of Ethical Conduct of Employees of the Executive Branch,* which prohibit them from participating in NSF proposals and awards affecting themselves and their home organizations.

In accordance with Federal Accounting Standards Advisory Board (FASAB) Statement of Federal Financial Accounting Standard (SFFAS) No. 47, *Reporting Entity*, financial information for the Arctic Research Commission (ARC), a consolidation entity for which NSF is accountable, is included in the accompanying financial statements and footnotes. ARC is an independent federal agency funded through NSF's appropriation, specifically as an activity in the Research and Related Activities account.

B. Basis of Presentation

These financial statements have been prepared to report the financial position and results of operations of NSF as required by the Chief Financial Officers Act of 1990, the Government Management Reform Act of 1994, the Reports Consolidation Act of 2000, and the Office of Management and Budget (OMB) Circular No. A-136, *Financial Reporting Requirements*, revised May 19, 2023. While the statements have been prepared from the books and records of NSF in accordance with U.S. Generally Accepted Accounting Principles (GAAP) for federal entities and the formats prescribed by OMB, the statements are in addition to the financial reports used to monitor and control budgetary resources, which are prepared from the same books and records.

In fiscal year (FY) 2023, NSF renamed the Directorate of Education and Human Resources to the Directorate of Science, Technology, Engineering, and Mathematics Education (EDU) which has been reflected in the accompanying financial statements and footnotes accordingly.

C. Basis of Accounting

The accompanying financial statements have been prepared in accordance with U.S. GAAP for federal entities using the accrual method of accounting. Under the accrual method, revenues are recognized when earned, and expenses are recognized when a liability is incurred, without regard to receipt or payment of cash. The accompanying financial statements also include budgetary accounting transactions that ensure compliance with legal constraints and controls over the use of federal funds.

In FY 2022, NSF implemented a prospective change in accounting principle to record and report foreign contributions in a Department of Treasury (Treasury) deposit fund account that were previously recorded in a trust fund account. NSF coordinated with OMB and Treasury to discuss the presentation and reporting requirements outlined in OMB Circular No. A-11, *Preparation, Submission, and Execution of the Budget*, OMB Circular No. A-136, *Financial Reporting Requirements*, and SFFAS No. 21, *Reporting Corrections of Errors and Changes in Accounting Principles*.

D. Budgetary Terms

The purpose of federal budgetary accounting is to control, monitor, and report on funds made available to federal agencies by law and help ensure compliance with the law. The following Budgetary Terms are commonly used:

> Appropriations are a provision of law authorizing the expenditure of funds for a given purpose. Usually, but not always, an appropriation provides budget authority.
>
> Budgetary Resources are amounts available to incur obligations in a given year.
>
> Offsetting Collections are payments to the government that, by law, are credited directly to expenditure accounts and deducted from gross budget authority and outlays of the expenditure account, rather than added to receipts. Usually, offsetting collections are authorized to be spent for the purposes of the account without further action by Congress. Offsetting collections usually result from business-like transactions with the public, including

payments from the public in exchange for goods and services, reimbursements for damages, and gifts or donations of money to the government and from intragovernmental transactions with other government accounts.

Offsetting Receipts are payments to the government that are credited to offsetting receipt accounts and deducted from gross budget authority and outlays, rather than added to receipts. They are usually deducted at the level of the agency and subfunction, but in some cases they are deducted at the level of the government as a whole. Offsetting receipts are not authorized to be credited to expenditure accounts. The legislation that authorizes the offsetting receipts may earmark them for a specific purpose and either appropriate them for expenditure for that purpose or require them to be appropriated in annual appropriations acts before they can be spent. Like offsetting collections, offsetting receipts usually result from business-like transactions with the public, including payments from the public in exchange for goods and services, reimbursements for damages, and gifts or donations of money to the government, and from intragovernmental transactions with other government accounts.

Obligations are binding agreements that will result in outlays, immediately or in the future.

Outlays are payments to liquidate an obligation. Outlays generally are equal to cash disbursements but are also recorded for cash-equivalent transactions, such as the issuance of debentures to pay insurance claims, and in a few cases are recorded on an accrual basis such as interest on public issues of the public debt. Outlays are the measure of government spending.

For further information about *Budgetary Terms* and concepts, please refer to the "Budget Concepts" chapter of the Analytical Perspectives volume of the President's Budget at https://www.whitehouse.gov/omb/analytical-perspectives/.

E. Revenues and Other Financing Sources

NSF receives a majority of its funding through appropriations contained in the Commerce, Justice, Science, and Related Agencies Appropriations Act. NSF receives annual, multi-year, and no-year appropriations that may be expended within statutory limits. NSF also receives funding via warrant from a receipt account for dedicated collections reported as Nonimmigrant Petitioner Account (H-1B) funds. Additional amounts are obtained from reimbursements for services performed for other federal agencies, and receipts to the NSF Donations Account. NSF also receives interest earned on overdue receivables, which is subsequently returned to the Treasury at the end of each fiscal year.

In FY 2023, the Consolidated Appropriations Act, 2023 under Public Law (P.L. 117-328), provided funding for NSF's appropriations. In addition, the Science Appropriations Act, 2023 provided an administrative provision allowing NSF to transfer up to 5 percent of current year funding between appropriations, but no appropriation may be increased by more than 10 percent. Appropriations are recognized as a financing source at the time the related “funded” program or administrative expenditures are incurred. Donations are recognized as revenues when funds are received.

Revenues from reimbursable agreements are recognized when the services are performed and the

related expenditures are incurred. Reimbursable agreements are mainly for grant administrative services provided by NSF on behalf of other federal agencies.

In FY 2022, the CHIPS and Science Act, 2022 under Public Law (P.L. 117-167) provided NSF funding for Creating Helpful Incentives to Produce Semiconductors (CHIPS) for America Workforce and Education Fund beginning in FY 2023. The CHIPS appropriation provides funding to support the domestic enhancement, development, and production of microelectronics and its workforce.

In accordance with 42 U.S.C. Section 1862 (a)(3), NSF has authority "to foster the interchange of scientific and engineering information among scientists and engineers in the United States and foreign countries" and in 42 U.S.C. Section 1870 (f), NSF is authorized to receive and use funds donated by others. These funds must be donated without restriction other than that they must be used in furtherance of one or more of the general purposes of the Foundation and are made available for obligations as necessary to support NSF programs. Donations may be received from private companies, academic institutions, non-profit foundations, and individuals.

NSF accepts contributions from foreign governments in support of various NSF-funded projects and the use of these funds is restricted to the awardee for which it is contributed. NSF does not retain ownership of funds contributed by foreign governments and solely acts as an intermediary to transfer the funds from foreign partners to the awardee. In accordance with OMB Circular No. A-11, *Preparation, Submission, and Execution of the Budget*, funds received by NSF from foreign governments are deposited and held in a deposit fund account at Treasury.

F. Fund Balance With Treasury and Cash and Other Monetary Assets

Fund Balance With Treasury (FBWT) is composed of appropriated funds that are available to pay current liabilities and finance authorized purchase commitments and non-appropriated funding sources from donations and foreign contributions. Foreign contributions are considered non-entity assets and are used to support awardees pursuant to agreements between NSF and foreign governments. *Cash and Other Monetary Assets* consist of undeposited collections, which are funds received by NSF, but not remitted to Treasury by September 30th. FBWT is an asset to NSF and a liability of the General Fund. *FBWT* is primarily increased by appropriations and decreased by disbursements. When disbursements are made, Treasury finances those disbursements using a combination of receipts, other inflows, and borrowing from the public (if there is a budget deficit). Cash receipts and disbursements are processed by Treasury.

G. Accounts Receivable, Net

Accounts Receivable, Net consists of amounts due from governmental agencies, private organizations, and individuals. It includes debts related to criminal restitutions adjudicated by the Department of Justice, where NSF is identified as the payee. Additionally, NSF has the right to conduct audits of awardees to verify billed amounts. These audits may result in monies owed back to NSF. Upon resolution of the amount owed by the awardee to NSF, a receivable is recorded.

NSF establishes an allowance for loss on accounts receivable that are deemed uncollectible in accordance with SFFAS 1, *Accounting for Selected Assets and Liabilities* and FASAB Technical Bulletin 2020-1, *Loss for Intragovernmental Receivables*. NSF analyzes each account independently to assess

collectability and the need for an offsetting allowance or write-off. NSF writes off delinquent debt from non-federal sources that is more than 2 years old. NSF's intragovernmental receivables are not written off, but rather the allowance is used to present the net realizable value.

Assets for Custodial and Non-Entity Liabilities – Other Than the General Fund of the US Government consist of a receivable of sequestered H-1B funds due from the Department of Homeland Security.

H. Advances and Prepayments

Advances and Prepayments consist of advances to federal agencies which are issued when agencies are operating under working capital funds or are unable to incur costs on a reimbursable basis. Advances are reduced when documentation supporting expenditures is received. Payments are only made within the amount of the recorded obligation.

I. General Property, Plant, and Equipment, Net

NSF capitalizes Property, Plant, and Equipment (PP&E) with costs exceeding $25 thousand and useful lives of 2 or more years; items not meeting these criteria are recorded as operating expenses. NSF currently reports capitalized PP&E at original acquisition value; assets acquired from the General Services Administration (GSA) excess property schedules are recorded at the value assigned by the donating agency; and assets transferred in from other agencies are valued at the cost recorded by the transferring entity for the asset net of accumulated depreciation or amortization.

The PP&E balance includes Equipment, Aircraft and Satellites, Buildings and Structures, Leasehold Improvements, Construction in Progress, Internal Use Software, and Software in Development. These balances are comprised of PP&E maintained “in-house” by NSF to support operations and PP&E under the United States Antarctic Program (USAP). The majority of USAP property is under the custodial responsibility of the NSF prime contractor for the program. The USAP is undergoing a multi-year modernization project initiated in FY 2019.

Depreciation expense is calculated using the straight-line method with a half-year convention. The half-year convention recognizes one-half of the annual depreciation expense in both the first and last years of an asset's useful life regardless of when it is placed in service. The economic useful life classifications for capitalized assets are as follows:

Equipment	
5 years	Computers and peripheral equipment, fuel storage tanks, laboratory equipment, and vehicles
7 years	Communications equipment, office furniture and equipment, pumps, and compressors
10 or 15 years	Generators, air traffic control, weather forecasting aids, and landing systems equipment
20 years	Movable buildings (e.g., trailers)

Aircraft and Satellites

7 years	Aircraft, aircraft standardizations, and satellites

Buildings and Structures

31.5 years	Buildings and structures placed in service prior to 1994
39 years	Buildings and structures placed in service after 1993

Leasehold Improvements

NSF's headquarters is leased through GSA under a non-cancelable occupancy agreement. Leasehold improvements performed by GSA are financed with NSF-appropriated funds. Amortization is calculated using the straight-line half-year convention upon transfer from construction in progress.

Construction in Progress

Costs incurred for construction projects are accumulated and tracked as construction in progress until the asset is placed in service. Beneficial Occupancy is the point in time when the facility is ready for safe occupancy and use by NSF. Items that pertain to the safety and health of any future occupants of the facility must be corrected before a Beneficial Occupancy is granted and the facility occupied. All construction efforts at the construction site may not be completed (e.g., punch list items or other minor construction activities may still be required for construction to be considered complete), but the facility space can be used for its intended purpose. When Beneficial Occupancy is granted, the project is transferred from construction in progress to real property and depreciated over the respective useful life of the asset.

Internal Use Software and Software in Development

NSF controls, values, and reports purchased or developed software as tangible property assets, in accordance with SFFAS No. 10, *Accounting for Internal Use Software*. NSF identifies software investments as capital property for items that, in the aggregate, cost $500 thousand or more to purchase, develop, enhance, or modify a new or existing NSF system, or configure a government-wide system for NSF needs. Software projects that are not completed at year-end and are expected to exceed the capitalization threshold are recorded as software in development. All internal use software meeting the capitalization threshold is amortized over a 5-year period using the straight-line half-year convention.

J. General Property, Plant, and Equipment in the Custody of Other Entities

NSF awards grants, cooperative agreements, and contracts to various organizations, including colleges and universities, non-profit organizations, state and local governments, Federally Funded Research and Development Centers (FFRDCs), and private entities. The funds provided may be used in certain cases to purchase or construct PP&E to be used for operations or research on projects or programs sponsored by NSF. In these instances, NSF funds the acquisition of property but transfers custody of the assets to these entities. NSF's authorizing legislation specifically prohibits the Foundation from operating such property directly.

In practice, NSF's ownership interest in such PP&E is similar to a reversionary interest. To address the accounting and reporting of these assets, specific guidance was sought by NSF and provided by the FASAB. This guidance stipulates that NSF should disclose the value of Federally Owned Property

(FOP) held by others in its financial statements based on information contained in the audited financial statements of these entities (if available). Entities that separately present net book value (NBV) of NSF-owned property in their audited financial statements are listed in Note 4, *Property, Plant, and Equipment in the Custody of Other Entities*, along with the NBV of the property held. Entities which hold FOP but do not separately present the NBV of NSF-owned property in their audited financial statements are also listed in Note 4, *Property, Plant, and Equipment in the Custody of Other Entities*, with a notation as "Unavailable."

K. Accounts Payable

Accounts Payable consists of liabilities to commercial vendors, contractors, and federal agencies. *Accounts Payable* are expenses for goods and services received but not yet paid for by NSF. At year-end, NSF accrues for the amount of estimated unpaid expenses to vendors and contractors for which invoices have not been received, but goods and services have been delivered and performed.

L. Other Intragovernmental Liabilities

Other Intragovernmental Liabilities consist primarily of the employer portion of payroll taxes and benefits, payroll taxes associated with unfunded leave, unfunded Federal Employees' Compensation Act (FECA), liabilities for non-entity assets, and reimbursable activities. A liability is recorded for payments made for workers' compensation pursuant to the FECA because NSF will reimburse the U.S. Department of Labor (DOL) 2 years after the payment of expenses. Liabilities for non-entity assets are recorded to offset accounts receivable balances associated with canceled appropriations. *Other Liabilities - Reimbursable Activities* consist of a rental credit liability.

M. Federal Employee Benefits Payable

Federal Employee Benefits Payable primarily consists of liabilities for actuarial FECA and unfunded employee leave. An actuarial liability is recorded for estimated future payments for workers' compensation pursuant to the FECA. The actuarial FECA liability is the present value of estimated future payments calculated by DOL and is recorded as an unfunded liability. Future appropriations will be used for DOL's estimated reimbursement.

Annual leave is accrued as it is earned, and the accrual is reduced as leave is taken. Each quarter, the balance in the accrued annual leave account is adjusted to reflect changes. To the extent current and prior year appropriations are not available to fund annual leave earned but not taken, funding will be obtained from future appropriations. Sick leave and other types of non-vested leave are expensed as taken.

N. Liabilities Not Covered by Budgetary Resources

Liabilities Not Covered by Budgetary Resources may include liabilities associated with future environmental cleanup, legal claims, FECA, unfunded leave, and a rental credit liability.

NSF cannot pay for liabilities unless authorized by law and covered by budgetary resources. Liabilities covered by budgetary resources are those for which appropriated funds are available as of the Balance Sheet date and include new budget authority, unobligated balances of budgetary resources, spending authority from offsetting collections, and recoveries of budget authority through downward adjustments of prior year obligations.

O. Other Liabilities (Other Than Intragovernmental)

Other Liabilities (Other Than Intragovernmental) consist of *Accrued Grant Liabilities, Accrued Payroll,* and a *Liability for Non-Fiduciary Deposit Funds and Undeposited Collections*.

Accrued Grant Liabilities consist of estimated liabilities to grantees for expenses incurred but not reported (IBNR) by September 30th. For standard grants and cooperative agreements, NSF's grant accrual methodology utilizes a linear regression model based on the statistical correlation between prior year unliquidated obligations and prior year expenses IBNR.

Accrued Grant Liabilities also consist of an accrual specifically for Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants. SBIR and STTR awards have unique terms and conditions compared to standard NSF grants and cooperative agreements. This methodology calculates any SBIR and STTR funds approved for payment, but not yet disbursed to the grantee as of September 30th.

Accrued Payroll relates to services performed by NSF employees and the Department of Interior's Business Center is NSF's payroll service provider. NSF accrues the amount of salaries earned but not paid as of the end of the reporting period.

Liability for Non-Fiduciary Deposit Funds and Undeposited Collections consists of foreign contributions and undeposited collections. NSF does not own or use the funds contributed by its foreign partners. NSF acts solely as an intermediary to transfer the funds from the foreign partner to the awardee which manages the applicable project. The *Liability for Non-Fiduciary Deposit Funds* does not have budgetary impacts. At year end, NSF also records *Undeposited Collections* which are funds received by NSF, but not remitted to Treasury by September 30th.

P. Net Position

Net Position is the residual difference between assets and liabilities and is composed of unexpended appropriations and cumulative results of operations, presented separately by dedicated collections and all other funds. *Unexpended Appropriations* represent the amount of undelivered orders and unobligated balances of budget authority. Unobligated balances are the amount of appropriations or other authority remaining after deducting the cumulative obligations from the amount available for obligation. *Cumulative Results of Operations* represent the net results of NSF’s operations since the Foundation's inception.

Q. Retirement Plan

In FY 2023, approximately 2 percent of NSF employees participated in the Civil Service Retirement System (CSRS), to which NSF matches contributions up to 7 percent of pay. The majority of NSF employees are covered by the Federal Employees Retirement System (FERS) and Social Security. A primary feature of FERS is the thrift savings plan to which NSF automatically contributes 1 percent of pay. The maximum NSF matching contribution is 5 percent of employee pay, of which 3 percent is fully matched, and 2 percent is matched at 50 percent. NSF also contributes to the employer's matching share for Social Security for FERS participants.

Although NSF funds a portion of the benefits under FERS and CSRS relating to its employees and withholds the necessary payroll deductions, the Foundation has no liability for future payments to employees under these plans, nor does NSF report CSRS, FERS, Social Security assets, or accumulated plan benefits on its financial statements. Reporting such amounts is the responsibility of the Office of Personnel Management (OPM) and the Federal Retirement Thrift Investment Board.

SFFAS No. 5, *Accounting for Liabilities of the Federal Government*, requires employing agencies to recognize the cost of pensions and other retirement benefits during their employees' active years of service. OPM actuaries determine pension cost factors by calculating the value of pension benefits expected to be paid in the future and provide these factors to the agency for current period expense reporting. Information is also provided by OPM regarding the full cost of health and life insurance benefits on OPM's Benefits Administration website: https://www.opm.gov/retirement-center/publications-forms/benefits-administration-letters/2023/23-304.pdf.

R. Contingencies and Possible Future Costs

Contingencies - Claims and Lawsuits: NSF is a party to various legal actions and claims brought against it. In the opinion of NSF management and legal counsel, the ultimate resolution of these actions and claims will not materially affect the financial position or operations of the Foundation. NSF recognizes the contingency in the financial statements when claims are probable, expected to result in a material loss, and the payment amounts can be reasonably estimated, whether from NSF's appropriations or the Judgment Fund, administered by the Department of Justice under Section 1304 of Title 31 of the U.S.C. There are some cases where the likelihood of loss is deemed reasonably possible. A contingent liability is not required to be recorded but the estimated loss must be disclosed in the footnotes. In addition, there are cases where the likelihood of loss is deemed remote. A contingent liability is not required to be recorded or disclosed for these cases.

Claims and lawsuits can also be made and filed against awardees of the Foundation by third parties. NSF is not a party to these actions and NSF believes there is no possibility that NSF will be legally required to satisfy such claims. Judgments or settlements of the claims against awardees that impose a financial obligation on them may be claimed as costs under the applicable contract, grant, or cooperative agreement and thus may affect the allocation of program funds in future fiscal years. In the event that the claim becomes probable and amounts can be reasonably estimated, the claim will be recognized.

Contingencies – Unasserted Claims: For claims and lawsuits that have not been made and filed against the Foundation, NSF management and legal counsel determine, in their opinion, whether the

resolution of the actions and claims they are aware of will materially affect the Foundation's financial position or operations. NSF recognizes a contingency in the financial statements if unasserted claims are probable of assertion, and if asserted, would be probable of an unfavorable outcome and expected to result in a measurable loss, whether from NSF's appropriations or the Judgment Fund. NSF discloses unasserted claims if the loss is more likely than not to occur, but the materiality of a potential loss cannot be determined.

Termination Claims: NSF engages organizations, including FFRDCs, in cooperative agreements and contracts to manage, operate, and maintain research facilities for the benefit of the scientific community. As part of these agreements and contracts, NSF funds on a pay-as-you-go basis certain employee benefit costs (accrued vacation and other employee related liabilities, severance pay and medical insurance), long-term leases, and vessel usage and drilling. In some instances, an award decision is made to continue operation of a facility with a different entity performing operation and management duties. In such an occurrence, NSF does not classify the facility as terminated. Claims submitted by the previous managing entity for expenditures not covered by the indirect cost rate included in the initial award are subject to audit and typically paid with existing program funds.

Agreements with FFRDCs include a clause that commits NSF to seek appropriations for termination expenses, if necessary, in the event a facility is terminated. NSF considers termination of these facilities only remotely possible. Should a facility be terminated, NSF is obligated to seek termination expenses for FFRDCs in excess of the limitation of funds set forth in the agreements, including any Post-Retirement Benefit liabilities, from Congress. Nothing in these agreements can be construed as implying that Congress will appropriate funds to meet the terms of any claims. Termination costs that may be payable to an FFRDC operator cannot be estimated until such time as the facility is terminated.

Environmental and Disposal Liabilities: NSF assesses the likelihood of required cleanup and establishes its environmental liability estimates in accordance with the requirements of the SFFAS No. 5, *Accounting for Liabilities of the Federal Government*, and as amended by SFFAS No. 12, *Recognition of Contingent Liabilities Arising from Litigation*, and SFFAS No. 6, *Accounting for Property, Plant, and Equipment*, and the Federal Financial Accounting and Auditing Technical Release No. 2, *Determining Probable and Reasonably Estimable for Environmental Liabilities in the Federal Government*.

Special attention is paid to USAP to ensure compliance with the Antarctic Conservation Act requirements for environmental cleanup in Antarctica. NSF continually monitors USAP in regards to environmental issues. While NSF is not legally liable for environmental cleanup costs in the Antarctic, there are occasions when the NSF Office of Polar Programs chooses to accept responsibility and commit funds toward cleanup efforts of various sites as resources permit. Decisions to commit funds are in no way driven by concerns of probable legal liability for failure to engage in such efforts, but rather a commitment to environmental stewardship of Antarctic natural resources. Environmental cleanup projects started and completed during the year are reflected in NSF's financial statements as expenses for the current fiscal year. An estimated cost would be accrued for approved projects that are anticipated to be performed after the fiscal year-end or will take more than one fiscal year to complete.

S. Use of Estimates

Management has made certain estimates and assumptions when reporting assets, liabilities, revenues, expenses, and note disclosures. Estimates underlying the accompanying financial statements can include accounting for grant liabilities, accounts payable, environmental liabilities, payroll, and PP&E. Actual results may differ from these estimates, and the difference will be adjusted for and included in the financial statements of the following quarter.

T. Permanent Indefinite Appropriations

NSF maintains permanent indefinite appropriations for Research and Related Activities (R&RA), STEM Education (EDU), Major Research Equipment and Facilities Construction (MREFC), and Creating Helpful Incentives to Produce Semiconductors (CHIPS). The R&RA appropriation is used for polar research and operations support, reimbursements to other federal agencies for operational and science support, and logistical and other related activities for USAP. The EDU appropriation is used to support science and engineering education, and human resources programs and activities. The MREFC appropriation supports the procurement and construction of unique national research platforms, major research equipment, and USAP modernization projects. The CHIPS appropriation is used to support the domestic development and production of microelectronics and to strengthen the domestic microelectronics workforce.

U. Classified Activities

Accounting Standards require all reporting entities to disclose that accounting standards allow certain presentations and disclosures to be modified, if needed, to prevent the disclosure of classified information.

Note 2. Fund Balance With Treasury

Fund Balance With Treasury (FBWT) consists of the following components as of September 30, 2023 and 2022:

(Amounts in Thousands)	2023	2022
Obligated, Not Yet Disbursed	$ 18,409,427	$ 17,937,943
Unobligated Available, Unexpired	781,785	326,625
Unobligated Unavailable, Unexpired	222,712	183,877
Unobligated Unavailable, Expired	208,249	183,284
Add: Non-Budgetary FBWT and Donations Sequestration	70,757	79,430
Total FBWT	$ 19,692,930	$ 18,711,159

Obligated, Not Yet Disbursed balances include obligations for which outlays have not been made. *Unobligated Available* balances include current period amounts available for obligation or commitment. *Unobligated Unavailable* balances include recoveries of prior year obligations and other unobligated expired funds that are unavailable for new obligations. *Non-Budgetary FBWT and Donations Sequestration* primarily includes a non-fiduciary deposit fund account for foreign contributions, which is a liability to NSF totaling $71 million as of September 30, 2023 and $79 million as of September 30, 2022. *Non-Budgetary FBWT and Donations Sequestration* are considered non-entity assets.

Note 3. General Property, Plant, and Equipment, Net

To support the Financial Report of the U.S. Government (FR) compilation process, the Property, Plant, and Equipment, Net reconciliation as of September 30, 2023 and 2022 is below:

(Amounts in Thousands)	2023	2022
	Net PP&E	Net PP&E
Balance Beginning of Fiscal Year	$ 477,798	$ 439,079
Capitalized Acquisitions	142,595	56,948
Dispositions/Revaluations	(101,769)	123
Depreciation Expense	(30,550)	(18,352)
Balance as of September 30, 2023 and 2022	$ 488,074	$ 477,798

The components of *Property, Plant, and Equipment, Net* as of September 30, 2023 and 2022 are shown below. As of September 30, 2023, NSF determined that scheduled maintenance or repairs on one item of Antarctic capital equipment in poor condition was not completed and was deferred or delayed for a future period. Further details on asset impairments and deferred maintenance are included in the Required Supplementary Information.

(Amounts in Thousands)	2023		
	Acquisition Value	Accumulated Depreciation/ Amortization	NBV
Equipment	$ 167,616	$ (143,956)	$ 23,660
Aircraft and Satellites	13,180	(13,180)	-
Buildings and Structures	373,933	(192,612)	181,321
Leasehold Improvements	30,584	(12,832)	17,752
Construction in Progress	147,630	-	147,630
Internal Use Software	194,502	(98,328)	96,174
Software in Development	21,537	-	21,537
Total PP&E	$ 948,982	$ (460,908)	$ 488,074

(Amounts in Thousands)	2022		
	Acquisition Value	Accumulated Depreciation/ Amortization	NBV
Equipment	$ 183,571	$ (157,388)	$ 26,183
Aircraft and Satellites	13,180	(13,180)	-
Buildings and Structures	376,365	(186,597)	189,768
Leasehold Improvements	29,729	(10,808)	18,921
Construction in Progress	120,967	-	120,967
Internal Use Software	87,642	(87,642)	-
Software in Development	121,959	-	121,959
Total PP&E	$ 933,413	$ (455,615)	$ 477,798

Note 4. General Property, Plant, and Equipment in the Custody of Other Entities

NSF received a ruling from FASAB on accounting for non-USAP PP&E owned by NSF but in the custody of and used by others (see Note 1J. *Property, Plant, and Equipment in the Custody of Other Entities*). The FASAB guidance requires NSF FOP in the custody of others be excluded from NSF PP&E as defined in the SFFAS No. 6, *Accounting for Property, Plant, and Equipment*. NSF is required to disclose the NBV of PP&E held by others for any entity which separately discloses NSF property in the most recently issued audited financial statements of the organization holding the assets.

Major facilities with significant FOP are required to disclose in their audited financial statements the value of FOP in their custody. With the exception of these major facilities, other entities which received NSF funding are not required to report FOP separately in their audited financial statements. For entities that hold FOP but do not disclose the NBV in their audited financial statements, the value of FOP will be listed as unavailable below.

Entities with Audited and Separately Reported NSF Federally Owned Property

(Amounts in Thousands)

	NBV	Fiscal Year Ending
Associated Universities, Inc.	$ 252,780	9/30/2022
Association of Universities for Research in Astronomy, Inc.	$ 1,228,235	9/30/2022
California Institute of Technology	Unavailable	9/30/2022
Dartmouth College	Unavailable	6/30/2022
Earthscope Consortium Inc.	$ 11,081	6/30/2022
Oregon State University	Unavailable	6/30/2022
SRI International	Unavailable	12/31/2022
University Corporation for Atmospheric Research	$ 50,637	9/30/2022
University of Alaska Fairbanks	$ 128,200	6/30/2022
University of California San Diego	Unavailable	6/30/2022
University of Central Florida Board of Trustees, The	Unavailable	6/30/2022
University of Hawaii System	Unavailable	6/30/2022
University of Rhode Island	Unavailable	6/30/2022
University of Washington	Unavailable	6/30/2022
University of Wisconsin System	$ 1,000	6/30/2022
Woods Hole Oceonographic Institution	Unavailable	12/31/2022

Note 5. Leases

NSF currently has an occupancy agreement with GSA for its headquarters in Alexandria, VA. This agreement is non-cancelable and active through FY 2032. In addition, this agreement contains escalation clauses tied to operating expenses and taxes. The following is a schedule of future minimum rental payments for the NSF headquarters:

(Amounts in Thousands)

Fiscal Year	Building Operating Lease Amount (Federal)
2024	25,125
2025	25,254
2026	25,386
2027	25,522
2028	25,663
2029 through 2032	101,563
Total Minimum Non-Cancelable Lease Payments	$ 228,513

NSF also has an occupancy agreement with GSA for warehouse space in Springfield, VA that will expire in FY 2029. The cancellation clauses with the agreements allow NSF to terminate use with 120-day notice. This agreement contains an escalation clause tied to operating expenses. In addition, the Springfield agreement contains a contingent rental based on re-appraised rental rates.

Note 6. Environmental and Disposal Liabilities

Restoration Projects

After an extensive evaluation process, NSF decided to cease scientific observations from the Sondrestrom Research Facility, a geophysical observatory in Kangerlussuaq, Greenland and to proceed with actions to restore the location. In FY 2019, NSF recorded an initial total estimated liability for the restoration project costs of $2 million to decommission and decontaminate the site. The estimated liability was $182 thousand and $1 million, respectively, as of September 30, 2023 and 2022.

Asbestos

Pursuant to FASAB Technical Bulletin 2006-1, *Recognition and Measurement of Asbestos-Related Cleanup Costs*, federal entities are required to recognize a liability for federal property asbestos cleanup costs. Some NSF-owned buildings and structures used to support USAP have been identified as having, or expecting to have, friable and non-friable asbestos containing material.

As required by SFFAS No. 6, *Accounting for Property, Plant, and Equipment*, NSF works with the current USAP contractor through the Antarctic Support Contract (ASC) to determine the need for asbestos liability adjustments based on actual asbestos costs incurred on an annual basis. Actual asbestos remediation costs are submitted by the ASC and the asbestos liability is adjusted for the impact. Changes to NSF's estimated asbestos liability consisted of the impact of asbestos remediation cost re-estimates since FY 2022. The asbestos liability was $12 million as of September 30, 2023 and 2022.

Note 7. Funds from Dedicated Collections

In FY 1999, Title IV of the American Competitiveness and Workforce Improvement Act of 1998 (P.L. 105-277) established the H-1B Nonimmigrant Petitioner Account in the General Fund of the U.S. Treasury. Funding is established from fees collected for alien, nonimmigrant status petitions. This law requires that a prescribed percentage of the funds in the account be made available to NSF for the following activities:

- Scholarships in Science, Technology, Engineering, and Mathematics
- Grants for Mathematics, Engineering, or Science Enrichment Courses
- Systemic Reform Activities

The H-1B Nonimmigrant Petitioner fees are available to the Director of NSF until expended. The funds may be used for scholarships to low income students, or to carry out a direct or matching grant program to support private and/or public partnerships in K-12 education. The H-1B fund is set up as a permanent indefinite appropriation by NSF. These funds are described in the Budget of the U.S. Government (President's Budget). *Funds from Dedicated Collections* are accounted for in a separate Treasury Account Symbol (TAS), and the budgetary resources are recorded as *Funds from Dedicated Collections Transferred In / (Out)*. *Funds from Dedicated Collections* are reported in accordance with SFFAS No. 43, *Funds from Dedicated Collections: Amending Statement of Federal Financial Accounting Standards 27, Identifying and Reporting Earmarked Funds*. As of September 30, 2023 and 2022, NSF was subject to H-1B sequestrations of $8 million and $11 million, respectively, for each year.

Balance Sheet as of September 30, 2023 and 2022

(Amounts in Thousands)	2023	2022
Assets		
Intragovernmental Assets		
Fund Balance With Treasury	$ 713,128	$ 723,813
Accounts Receivable, Net		
Asset for Custodial and Non-Entity Liabilities - Other Than the General Fund of the US Government	7,692	10,827
Total Accounts Receivable, Net	7,692	10,827
Total Intragovernmental Assets	720,820	734,640
Total Assets	**$ 720,820**	**$ 734,640**
Other Than Intragovernmental Liabilities		
Accounts Payable	$ 303	$ 262
Other Liabilities		
Accrued Grant Liabilities	17,047	18,431
Total Other Liabilities	17,047	18,431
Total Other Than Intragovernmental Liabilities	17,350	18,693
Total Liabilities	**$ 17,350**	**$ 18,693**
Net Position		
Cumulative Results of Operations	$ 703,470	$ 715,947
Total Net Position	**$ 703,470**	**$ 715,947**
Total Liabilities and Net Position	**$ 720,820**	**$ 734,640**

Statement of Net Cost for the Years Ended September 30, 2023 and 2022

(Amounts in Thousands)	2023	2022
Gross Costs	$ 147,416	$ 131,856
Less: Earned Revenue	-	-
Net Cost of Operations	**$ 147,416**	**$ 131,856**

Statement of Changes in Net Position for the Years Ended September 30, 2023 and 2022

(Amounts in Thousands)	2023	2022
Beginning Balances	**$ 715,947**	**$ 657,863**
Transfer In / (Out) Without Reimbursement	134,939	189,940
Net Cost of Operations	(147,416)	(131,856)
Net Change in Cumulative Results of Operations	(12,477)	58,084
Net Position	**$ 703,470**	**$ 715,947**

Note 8. Notes Related to the Statement of Budgetary Resources

A. Adjustments to Unobligated Balances Brought Forward

In accordance with SFFAS No. 7, *Accounting for Revenue and Other Financing Sources and Concepts for Reconciling Budgetary and Financial Accounting*, NSF is required to disclose adjustments made during the current reporting period to budgetary resources available at the beginning of the year. In FY 2023, NSF recorded adjustments to reclassify obligations between expired and unexpired treasury account symbols resulting in a $3 million net adjustment to the "Unobligated Balance from Prior Year Budget Authority, Net" line on the Statement of Budgetary Resources. These adjustments are also reflected on NSF's SF-133, *Report on Budget Execution and Budgetary Resources*.

B. Undelivered Orders at the End of the Year

In accordance with SFFAS No. 7, *Accounting for Revenue and Other Financing Sources and Concepts for Reconciling Budgetary and Financial Accounting*, the amount of budgetary resources obligated for undelivered orders was $18 billion and $17 billion for the years ended September 30, 2023 and 2022.

(Amounts in Thousands)	2023	2022
Undelivered Orders, Unpaid - Non-Federal	$ 17,585,754	$ 17,166,067
Undelivered Orders, Paid - Federal	30,679	24,144
Undelivered Orders, Unpaid - Federal	238,805	222,380
Total Undelivered Orders - Federal	269,484	246,524
Total Undelivered Orders	$ 17,855,238	$ 17,412,591

C. Explanation of Differences between the Statement of Budgetary Resources and the Budget of the United States Government

SFFAS No. 7, *Accounting for Revenue and Other Financing Sources and Concepts for Reconciling Budgetary and Financial Accounting*, requires explanations of material differences between amounts reported in the Statement of Budgetary Resources (SBR) and the actual balances published in the President's Budget. The FY 2025 President's Budget will include FY 2023 budget execution information and is scheduled for publication in the spring of 2024 and can be found upon publication on the OMB website at: http://www.whitehouse.gov/omb.

Balances reported in the FY 2022 SBR and the related President's Budget are shown in a table below for Budgetary Resources, New Obligations and Upward Adjustments, Distributed Offsetting Receipt, and Net Outlays, and any related differences. The differences reported are due to differing reporting requirements for expired and unexpired appropriations between the Treasury guidance used to prepare the SBR and the OMB guidance used to prepare the President's Budget. The SBR includes both unexpired and expired appropriations, while the President's Budget presents only unexpired budgetary resources that are available for new obligations. Additionally, the Distributed Offsetting Receipts amount on the SBR includes donations, while the President's Budget does not.

(Amounts in Thousands)	2022			
	Budgetary Resources	New Obligations and Upward Adjustments	Distributed Offsetting Receipts	Net Outlays
Combined Statement of Budgetary Resources	$ 10,217,494	$ 9,523,708	$ 26,554	$ 8,159,356
Expired Accounts	(255,782)	(72,498)	-	-
Budget of the U.S. Government	$ 9,961,712	$ 9,451,210	$ 26,554	$ 8,159,356

Note 9. Awards to Affiliated Institutions

NSB members may be affiliated with institutions that are eligible to receive grants and awards from NSF. NSF made awards totaling $928 million to Board member affiliated institutions as of September 30, 2023. The Board does not review all NSF award actions; however, the following require NSB approval for the NSF Director to take action under delegated authority:

- Proposed awards where the average annual award amount is the greater of 1 percent of the prior year current plan of the awarding directorate/office, or 0.1 percent of the prior year enacted NSF budget level;
- MREFC awards;
- Amendments to awards and procurement actions specifying a dollar amount in the Board resolution, if the amended award exceeds the lesser of $10 million dollars or 20 percent of the amount specified in the Board resolution; and
- In the case of procurements when no amount was specified in the Board resolution, if the amended amount exceeds the lesser of $10 million dollars or 20 percent of the contract ceiling award amount.

The Director will continue to consult with the NSB on programs which represent a significant, long-term investment, particularly those which will be funded as an ongoing NSF-wide activity or which involve substantive policy, interagency, or international issues.

The Director's Review Board (DRB) reviews proposed actions for evaluation adequacy and documentation, and compliance with Foundation policies, procedures, and strategies. Items requiring DRB action include large awards and Requests for Proposal that meet or exceed a threshold of 2.5 percent of the prior year Division or Subactivity Plan. In addition, the DRB reviews all items requiring NSB action as well as NSB information items prior to submission.

NSF may fund awards meeting the above requirements to institutions affiliated with Board members. 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 or delegee. Prior to Board meetings, all NSB action items are screened for conflict of interest/impartiality concerns by the NSB Counsel and a Legal Administrative Specialist in the NSB. Members who have conflicts are either recused from the matter or receive a waiver from the Deputy Ethics Official to participate. NSB did not approve any awards to Board member affiliated institutions in FY 2023.

Note 10. Reconciliation of Net Cost to Net Outlays (Budget to Accrual Reconciliation)

The Reconciliation of Net Cost to Net Outlays reconciles the net costs for a federal entity's programs and operations to the net outlays for that entity. The reconciliation validates the relationship between budgetary and proprietary accounting information. Examples of the reconciling items identified are: (1) transactions which resulted in an outlay but did not result in a cost; (2) unpaid expenses included in the net cost in this reporting period but not yet included in outlays; and (3) other temporary timing differences such as special adjustments including prior period adjustments due to correction of errors.

(Amounts in Thousands)	2023		
	Federal	**Public**	**Total**
Net Cost	**$ 181,220**	**8,848,001**	**9,029,221**
Components of Net Cost Not Part of Net Agency Outlays			
Property, Plant, and Equipment Depreciation Expense	-	(30,550)	(30,550)
Applied Overhead / Cost Capitalization Offset	-	40,854	40,854
Increase / (Decrease) in Assets:			
Accounts Receivable, Net	(633)	(850)	(1,483)
Other Assets	6,535	67	6,602
(Increase) / Decrease in Liabilities:			
Accounts Payable	5,157	(46,196)	(41,039)
Environmental and Disposal Liabilities		796	796
Federal Employee and Veteran Benefits Payable	-	(1,315)	(1,315)
Other Liabilities	(2,272)	(203)	(2,475)
Financing Sources:			
Imputed Costs	(22,099)	-	(22,099)
Total Components of Net Cost Not Part of Net Agency Outlays	**(13,312)**	**(37,397)**	**(50,709)**
Components of Net Agency Outlays Not Part of Net Cost			
Donated Revenue	-	(27,743)	(27,743)
Transfers Out (In) Without Reimbursement	-	-	-
Total Components of Net Agency Outlays Not Part of Net Cost	**-**	**(27,743)**	**(27,743)**
Miscellaneous Items			
Custodial / Non-Exchange Revenue	-	-	-
Total Miscellaneous Items	**-**	**-**	**-**
Net Agency Outlays	**$ 167,908**	**8,782,861**	**8,950,769**

Related Amounts on the Statement of Budgetary Resources	
Net Outlays	$ 8,982,258
Distributed Offsetting Receipts	(31,489)
Net Agency Outlays	**$ 8,950,769**

(Amounts in Thousands)	2022		
	Federal	**Public**	**Total**
Net Cost	**$ 215,562**	**7,974,699**	**8,190,261**
Components of Net Cost Not Part of Net Outlays			
Property, Plant, and Equipment Depreciation	-	(18,352)	(18,352)
Applied Overhead / Cost Capitalization Offset	-	57,071	57,071
Increase/(Decrease) in Assets:			
Accounts Receivable	(4,074)	1,527	(2,547)
Other Assets	(8,584)	9	(8,575)
(Increase)/Decrease in Liabilities Not Affecting Net Outlays:			
Accounts Payable	(28,656)	(28,472)	(57,128)
Federal Employee and Veteran Benefits Payable	-	(133)	(133)
Environmental and Disposal Liabilities	-	50	50
Other Liabilities	383	7,149	7,532
Other Financing Sources:			
Imputed Financing	(14,439)	-	(14,439)
Total Components of Net Cost Not Part of the Net Outlays	**(55,370)**	**18,849**	**(36,521)**
Components of Net Outlays Not Part of Net Cost			
Donated Revenue	-	(20,230)	(20,230)
Transfers Out (In) Without Reimbursement	(2)	-	(2)
Total Components of Net Outlays Not Part of Net Cost	**(2)**	**(20,230)**	**(20,232)**
Miscellaneous Items			
Custodial / Non-Exchange Revenue	(706)	-	(706)
Total Miscellaneous Items	**(706)**	**-**	**(706)**
Net Agency Outlays	**$ 159,484**	**7,973,318**	**8,132,802**

Related Amounts on the Statement of Budgetary Resources	
Net Outlays	$ 8,159,356
Distributed Offsetting Receipts	(26,554)
Net Agency Outlays	**$ 8,132,802**

Note 11. COVID-19 Activity

As part of the American Rescue Plan (ARP) Act of 2021 (P.L. 117-2), the National Science Foundation (NSF) received $600 million "to fund or extend new and existing research grants, cooperative agreements, scholarships, fellowships, and apprenticeships, and related administrative expenses to prevent, prepare for, and respond to coronavirus." NSF allocated the funding as shown in the table below.

(Amounts in Thousands)	2022
NSF by Account	ARP Act Amount
R&RA[1]	$ 472,000
EDU	61,000
MREFC[1]	55,000
AOAM	12,000
Total	$ 600,000

[1]Reflects $5 million reallocated from the MREFC account to the R&RA account that occurred in FY 2022.

The budget authority of ARP Act funds expired at the end of FY 2022 for new obligations. The status of budgetary resources as of September 30, 2023 and 2022 was as follows:

(Amounts in Thousands)	2023		
NSF by Account	Unpaid Obligations	Outlays	Unobligated Balance (Expired)
R&RA	$ 243,931	$ 149,401	$ 1,206
EDU	41,592	14,186	-
MREFC	15,090	28,884	1
AOAM	-	-	-
Total	**$ 300,613**	**$ 192,471**	**$ 1,207**

(Amounts in Thousands)	2022		
NSF by Account	Unpaid Obligations	Outlays	Unobligated Balance (Unexpired)
R&RA	$ 394,420	$ 74,904	$ 119
EDU	55,778	5,221	-
MREFC	43,974	3,867	-
AOAM	-	3,368	-
Total	**$ 494,172**	**$ 87,360**	**$ 119**

NSF continues to invest its base appropriations in programs that, while not expressly intended to address COVID-19, nonetheless support individuals and institutions disproportionally impacted by the coronavirus pandemic. In particular, NSF is structuring the investments to: (i) reach the most strongly affected groups; (ii) support individuals at vulnerable career transition points; and (iii) ensure broad distribution.

Obligations for COVID-19 activities, by funding source, as of September 30, 2023 and 2022:

(Amounts in Thousands)	2023				
NSF by Account	ARP Act	Base Appropriation	CHIPS	H-1B Fees Mandatory+ Reimbursable+ Donations	Total
R&RA	$ -	$ 721,894	$ -	$ 768	$ 722,662
EDU	-	199,454	-	12,470	211,924
MREFC	-	24,120	-	-	24,120
CHIPS	-	-	3,000	-	3,000
AOAM	-	1	-	-	1
Donations	-	-	-	359	359
Total	**$ -**	**$ 945,469**	**$ 3,000**	**$ 13,597**	**$ 962,066**

(Amounts in Thousands)	2022				
NSF by Account	ARP Act	Base Appropriation	CHIPS	H-1B Fees Mandatory+ Reimbursable	Total
R&RA	$ 277,114	$ 814,172	$ -	$ 2,662	$ 1,093,948
EDU	37,005	180,150	-	27,085	244,240
MREFC	46,529	21	-	-	46,550
CHIPS	-	-	-	-	-
AOAM	-	2	-	-	2
Donations	-	-	-	-	-
Total	**$ 360,648**	**$ 994,345**	**$ -**	**$ 29,747**	**$ 1,384,740**

Note 12. Reclassification of Financial Statement Line Items for FR Compilation Process

To prepare the FR, the Department of the Treasury requires agencies to submit an adjusted trial balance, which is a listing of amounts by U.S. Standard General Ledger account that appear in the financial statements. Treasury uses the trial balance information reported in the Governmentwide Treasury Account Symbol Adjusted Trial Balance System (GTAS) to develop a Reclassified Statement of Net Cost, and a Reclassified Statement of Changes in Net Position. Treasury eliminates intragovernmental balances from the reclassified statements and aggregates lines with the same title to develop the FR statements. This note shows NSF's financial statements and reclassified statements prior to elimination of intragovernmental balances and prior to aggregation of repeated FR line items. A copy of the 2022 FR can be found on the FR website and a copy of the 2023 FR will be posted to this site as soon as it is released: https://www.fiscal.treasury.gov/reports-statements/

The term "intragovernmental" is used in this note to refer to amounts that result from transactions with other components of the Federal Government. The term "non-federal" is used to refer to transactions with non-federal entities. These include transactions with individuals, businesses, non-profit entities, and State, local, and foreign governments.

Reclassification of Statement of Net Cost (SNC) to Line Items Used for the Government-wide SNC for the Year Ending September 30, 2023 (Amounts in Thousands)

FY 2023 National Science Foundation SNC		Line Items Used to Prepare FY 2023 Government-wide SNC			
Financial Statement Line	**Amount**	**Dedicated Collections**	**Other Than Dedicated Collections**	**Total**	**Reclassified Financial Statement Line**
GROSS COSTS					**GROSS COSTS**
Research and Related Activities	$ 7,728,989	$ 147,416	8,703,839	$ 8,851,255	Non-Federal Gross Cost
		147,416	8,703,839	8,851,255	Total Non-Federal Gross Cost
STEM Education	1,118,744		54,191	54,191	Benefit Program Costs
Major Research Equipment and Facilities Construction	147,704		22,099	22,099	Imputed Costs
CHIPS for America Workforce and Education	840		212,680	212,680	Buy/Sell Costs
Donations and Dedicated Collections	160,257		16,309	16,309	Other Expenses (Without Reciprocals)
			305,279	305,279	Total Federal Gross Cost
TOTAL GROSS COSTS	**$ 9,156,534**	**$ 147,416**	**9,009,118**	**$ 9,156,534**	**TOTAL GROSS COSTS**
EARNED REVENUE					**EARNED REVENUE**
Research and Related Activities	$ (120,476)		(3,253)	$ (3,253)	Non-Federal Earned Revenue
			(3,253)	(3,253)	Total Non-Federal Earned Revenue
STEM Education	(6,837)		(124,060)	(124,060)	Buy/Sell Revenue (Exchange)
			(124,060)	(124,060)	Total Federal Earned Revenue
TOTAL EARNED REVENUE	**$ (127,313)**		**(127,313)**	**$ (127,313)**	**TOTAL EARNED REVENUE**
NET COST OF OPERATIONS	**$ 9,029,221**	**$ 147,416**	**8,881,805**	**$ 9,029,221**	**NET COST OF OPERATIONS**

Reclassification of Statement of Changes in Net Position (SCNP) to Line Items Used for the Government-wide Statement of Operations and Changes in Net Position for the Year Ending September 30, 2023 (Amounts in Thousands)

FY 2023 National Science Foundation SCNP		Line Items Used to Prepare FY 2023 Government-wide SCNP				
Financial Statement Line	**Amount**	**Dedicated Collections**	**Other Than Dedicated Collections**	**Total**	**Reclassified Financial Statement Line**
UNEXPENDED APPROPRIATIONS					
Beginning Balance	**$ 17,249,150**	**$ 715,947**	**17,721,685**	**$ 18,437,632**	**Net Position, Beginning of Period (Includes Cumulative Results of Operations and Unexpended Appropriations)**
Appropriations Received	9,901,511		9,806,885	9,806,885	Appropriations Received as Adjusted
Other Adjustments (Canceled Authority)	(94,626)				
Appropriations Used	(8,865,863)		(8,865,863)	(8,865,863)	Appropriations Used
Net Change in Unexpended Appropriations	**941,022**				
TOTAL UNEXPENDED APPROPRIATIONS	**$ 18,190,172**				
CUMULATIVE RESULTS OF OPERATIONS					
Beginning Balance	**$ 1,188,482**				
Appropriations Used	8,865,863		8,865,863	8,865,863	Appropriations Expended
Non-Exchange Revenue	3		27,717	27,717	Other Taxes and Receipts
Donations	27,743				
Other (1 of 2)	(29)				
Total Non-Exchange Revenues	27,717		27,717	27,717	Total Non-Federal Non-Exchange Revenues
		(3,135)	-	(3,135)	Accruals for Entity Amounts to be Collected in a TAS Other Than the General Fund of the U.S. Government - Non-Exchange (RC 16)
		145,765	-	145,765	Appropriation of Unavailable Special/Trust Fund Receipts Transfers-In
		(7,691)	-	(7,691)	Appropriation of Unavailable Special/Trust Fund Receipts Transfers-Out
Transfers In / (Out) Without Reimbursement	134,939	134,939	-	134,939	Total Appropriation of Unavailable Special/Trust Fund Receipts Transfers-In
Imputed Financing	22,099		22,099	22,099	Imputed Financing Sources
			(3,746)	(3,746)	Non-Entity Collections Transferred to the General Fund of the U.S. Government
			492	492	Accrual for Non-Entity Amounts to be Collected and Transferred to the General Fund of the U.S. Government
Other (2 of 2)	(3,254)		(3,254)	(3,254)	Total Non-Entity Collections Transferred and Accrual for Non-Entity Amounts to be Collected and Transferred to the General Fund of the U.S. Government
Net Cost of Operations	(9,029,221)	(147,416)	(8,881,805)	(9,029,221)	Net Cost of Operations
Net Change in Cumulative Results of Operations	**18,143**				
TOTAL CUMULATIVE RESULTS OF OPERATIONS	**$ 1,206,625**				
NET POSITION	**$ 19,396,797**	**$ 703,470**	**18,693,327**	**$ 19,396,797**	**NET POSITION**

REQUIRED SUPPLEMENTARY INFORMATION

Deferred Maintenance and Repairs

For the Fiscal Years ended September 30, 2023 and 2022

Deferred Maintenance and Repairs

NSF performs condition assessment surveys in accordance with SFFAS No. 42, *Deferred Maintenance and Repairs*, for capitalized PP&E, including fully depreciated personal property to determine if any maintenance and repairs are needed to keep an asset in an acceptable condition or restore an asset to a specific level of performance. NSF considers deferred maintenance and repairs to be any maintenance and repairs that are not performed on schedule, unless it is determined from the condition of the asset that scheduled maintenance does not have to be performed. Deferred maintenance and repairs also include any other type of maintenance or repair that, if not performed, would render the PP&E non-operational. Circumstances such as non-availability of parts or funding are considered reasons for deferring maintenance and repairs.

NSF considered whether any scheduled maintenance or repair necessary to keep fixed assets of the agency in an acceptable condition was deferred at the fiscal years ended September 30, 2023 and 2022. Assets deemed to be in excellent, good, or fair condition are considered to be in acceptable condition. Assets in poor or very poor condition are in unacceptable condition and the deferred maintenance and repairs required to get them to an acceptable condition are reported. NSF determines the condition of an asset in accordance with standards comparable to those used in the private industry. Due to the environment and remote location of Antarctica, all deferred maintenance, and repairs on assets in poor or very poor condition are considered critical in order to maintain operational status.

In accordance with SFFAS No. 42, NSF disclosed the beginning and ending balances for deferred maintenance. NSF determined that scheduled maintenance or repairs on one item of Antarctic capital equipment in poor condition was not completed and was deferred or delayed for a future period. The dollar amount of the deferred maintenance for this item remained $300 thousand as of the fiscal years ended September 30, 2023 and 2022. The item was heavy mobile equipment and was considered critical to NSF operations.

REQUIRED SUPPLEMENTARY INFORMATION

Combining Statement of Budgetary Resources by Major Budget Accounts

In the following tables, NSF budgetary information for the fiscal years ended September 30, 2023 and 2022, as presented in the Statement of Budgetary Resources, is disaggregated for each of NSF's major budget accounts.

Combined Statement of Budgetary Resources

2023

(Amounts in Thousands)

	R&RA	EDU	MREFC	CHIPS	OIG, AOAM, and NSB	Special and Donated	Total
Budgetary Resources							
Unobligated Balance from Prior Year Budget Authority, Net	$ 375,625	62,157	335,449	-	19,495	82,067	874,793
Appropriations	7,841,799	1,371,000	187,230	25,000	476,483	165,816	10,067,328
Spending Authority from Offsetting Collections	107,375	16,408	-	-	8,802	-	132,585
Total Budgetary Resources	**$ 8,324,799**	**1,449,565**	**522,679**	**25,000**	**504,780**	**247,883**	**11,074,706**
Status of Budgetary Resources							
New Obligations and Upward Adjustments	$ 7,740,435	1,301,054	161,362	25,000	493,766	140,343	9,861,960
Unobligated Balance, End of Period:							
Apportioned, Unexpired	406,843	104,371	186,434	-	664	83,473	781,785
Unapportioned, Unexpired	10,965	9,224	174,882	-	3,574	24,067	222,712
Unobligated Balance, Unexpired, End of Period	417,808	113,595	361,316	-	4,238	107,540	1,004,497
Unobligated Balance, Expired, End of Period	166,556	34,916	1	-	6,776	-	208,249
Total Unobligated Balance, End of Period	584,364	148,511	361,317	-	11,014	107,540	1,212,746
Total Status of Budgetary Resources	**$ 8,324,799**	**$ 1,449,565**	**$ 522,679**	**$ 25,000**	**$ 504,780**	**$ 247,883**	**$ 11,074,706**
Net Outlays							
Net Outlays	$ 7,158,000	1,057,433	157,076	135	455,199	154,415	8,982,258
Distributed Offsetting Receipts	-	-	-	-	-	(31,489)	(31,489)
Net Agency Outlays	**7,158,000**	**1,057,433**	**157,076**	**135**	**455,199**	**122,926**	**8,950,769**

Combined Statement of Budgetary Resources

2022

(Amounts in Thousands)

	R&RA	EDU	MREFC	CHIPS	OIG, AOAM, and NSB	Special and Donated	Total
Budgetary Resources							
Unobligated Balance from Prior Year Budget Authority, Net	$ 556,200	82,820	255,790	-	7,460	152,671	1,054,941
Appropriations	6,999,520	1,149,460	265,520	-	448,500	208,091	9,071,091
Spending Authority from Offsetting Collections	79,242	4,950	-	-	7,270	-	91,462
Total Budgetary Resources	**$ 7,634,962**	**1,237,230**	**521,310**	**-**	**463,230**	**360,762**	**10,217,494**
Status of Budgetary Resources							
New Obligations and Upward Adjustments	$ 7,400,190	1,196,006	190,581	-	451,426	285,505	9,523,708
Unobligated Balance, End of Period:							
Apportioned, Unexpired	78,870	4,735	175,745	-	5,279	61,996	326,625
Unapportioned, Unexpired	8,755	6,877	154,984	-	-	13,261	183,877
Unobligated Balance, Unexpired, End of Period	87,625	11,612	330,729	-	5,279	75,257	510,502
Unobligated Balance, Expired, End of Period	147,147	29,612	-	-	6,525	-	183,284
Total Unobligated Balance, End of Period	234,772	41,224	330,729	-	11,804	75,257	693,786
Total Status of Budgetary Resources	**$ 7,634,962**	**1,237,230**	**521,310**	**-**	**463,230**	**360,762**	**10,217,494**
Net Outlays							
In ₂ Net Outlays	$ 6,573,104	872,450	155,535	-	427,119	131,148	8,159,356
Distributed Offsetting Receipts	-	-	-	-	-	(26,554)	(26,554)
Net Agency Outlays	**$ 6,573,104**	**872,450**	**155,535**	**-**	**427,119**	**104,594**	**8,132,802**

Chapter 3
Appendices (Other Information)

SUMMARY OF FY 2023 FINANCIAL STATEMENT AUDIT AND MANAGEMENT ASSURANCES

The following tables summarize NSF's FY 2023 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 2024

NATIONAL SCIENCE FOUNDATION
Office of Inspector General

October 13, 2023

NATIONAL SCIENCE FOUNDATION
Office of Inspector General

MEMORANDUM

DATE: October 13, 2023

TO: Dr. Dan Reed
Chair
National Science Board

Dr. Sethuraman Panchanathan
Director
National Science Foundation

FROM: Allison C. Lerner
Inspector General

SUBJECT: Management Challenges for the National Science Foundation in Fiscal Year 2024

Attached for your information is our report, *Management Challenges for the National Science Foundation in Fiscal Year 2024*. The *Reports Consolidation Act of 2000* (Pub. L. No. 106-531) requires us to annually update our assessment of the "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.

We appreciate the courtesies and assistance NSF staff provided during the completion of this report.

If you have questions, please contact me at 703-292-7100.

Attachment

2415 Eisenhower Avenue, Alexandria, Virginia 22314 | 703-292-7100 | oigpublicaffairs@nsf.gov | oig.nsf.gov

At a Glance

Management Challenges for the National Science Foundation in Fiscal Year 2024

October 13, 2023

WHY WE ISSUED THIS REPORT

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

WHAT WE FOUND

Each year, we identify NSF's most serious challenges based on our audit and investigative work, knowledge of NSF's operations, independent sources such as U.S. Government Accountability Office reports and NSF's advisory committees, and discussions with NSF senior staff and contractors. This year, we identified eight areas representing the most serious management and performance challenges facing NSF:

- Challenge 1: Overseeing and Managing Risks of Sexual Assault/Harassment in Antarctica
- Challenge 2: Addressing Sexual Harassment in the Scientific Enterprise
- Challenge 3: Increasing Diversity in Science & Engineering Education and Employment
- Challenge 4: Overseeing the United States Antarctic Program (USAP)
- Challenge 5: Overseeing NSF's Funding Portfolio in a Changing Environment
- Challenge 6: Managing Human Capital
- Challenge 7: Mitigating Threats to Research Security
- Challenge 8: Mitigating Threats Posed by the Risk of Cyberattacks

We are encouraged by NSF's progress in its efforts to address critical management and performance challenges. Effective responses to these challenges will 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 2023*

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 2023* in its Agency Financial Report.

Table of Contents

Introduction

The National Science Foundation is an independent federal agency that supports fundamental research and education in all the non-medical fields of science and engineering. With a budget of approximately $8.8 billion (FY 2022), NSF funds about 25 percent of all federally supported basic research at the Nation's colleges and universities, and supports about 200,000 scientists, engineers, educators, and students each year. NSF's goals include advancing the frontiers of knowledge, cultivating a broadly inclusive science and engineering workforce, expanding the scientific literacy of all citizens, building the nation's research capability through investments in advanced instrumentation and facilities, and supporting excellence in science and engineering research and education.

The *Reports Consolidation Act of 2000* (Pub. L. No. 106-531) requires us annually to update our assessment of NSF's "most serious management and performance challenges … and the agency's progress in addressing those challenges." Each year, we identify these challenges based on our audit and investigative work, knowledge of the Foundation's operations, independent sources such as U.S. Government Accountability Office reports and NSF's advisory committees, and discussions with NSF senior staff and contractors. 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]
- The issue presents a risk of fraud, waste, or abuse to NSF or other government assets.
- The issue involves strategic alliances with other agencies, the Office of Management and Budget, the Administration, Congress, or the public.
- The issue is related to key initiatives of the President.

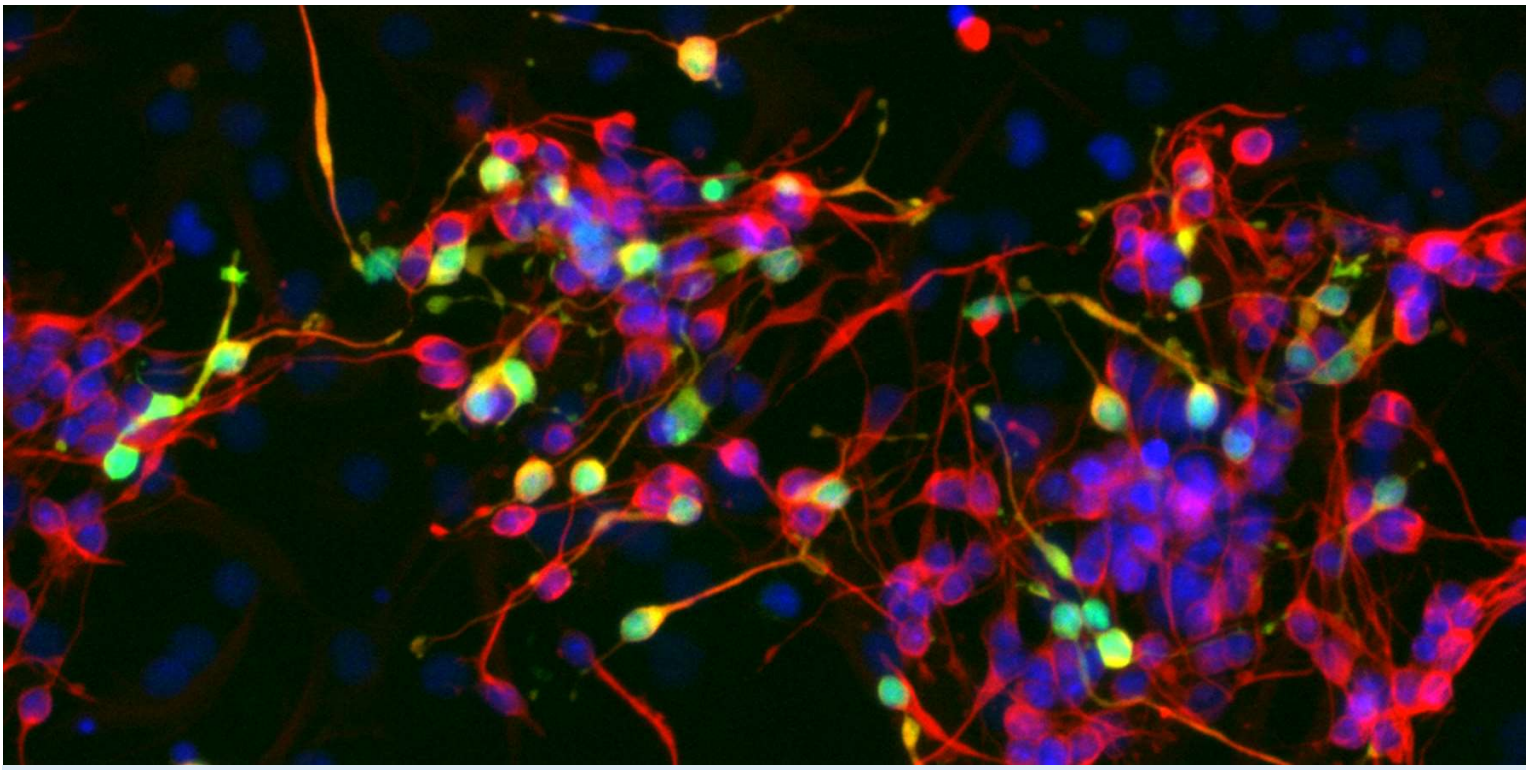
It is important to note that identifying an issue as a "management challenge" does not necessarily mean NSF is having difficulty addressing it; instead, it means we identify the issue as one of the top challenges facing NSF and report on NSF's progress in addressing it, as required by the Act.

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

- Overseeing and Managing Risks of Sexual Assault/Harassment in Antarctica
- Addressing Sexual Harassment in the Scientific Enterprise
- Increasing Diversity in Science & Engineering Education and Employment
- Overseeing the United States Antarctic Program (USAP)
- Overseeing NSF's Funding Portfolio in a Changing Environment
- Managing Human Capital
- Mitigating Threats to Research Security
- Mitigating Threats Posed by the Risk of Cyberattacks

This year, we are introducing two new challenge areas. We removed our prior challenge focused on managing the Intergovernmental Personnel Act Program; we instead discuss challenges NSF may face

[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."



Discovery of noncoding ribonucleic acid (RNA) molecule made in a lab, including, among others, an NSF Graduate Research Fellowship recipient. *Credit: Rebecca Andersen, Developmental and Stem Cell Biology Graduate Program, University of California, San Francisco*

with the program in a new challenge, "Managing Human Capital." We added a new challenge area, "Overseeing and Managing Risks of Sexual Assault/Harassment in Antarctica," to address issues previously described within other challenge areas and give NSF leadership a fuller picture of the challenges in this area.

In addition, we renamed two prior challenge areas to better reflect the challenges they describe: "Overseeing NSF's Funding Portfolio in a Changing Environment" expands upon the prior challenge "Overseeing Grants in a Changing Environment," and "Addressing Sexual Harassment in the Scientific Enterprise" expands upon the prior challenge "Addressing Sexual Harassment in the Academic Community."

Finally, we have removed the prior-year challenge of "Overseeing NSF-Funded Research Infrastructure." NSF is developing its capacity to oversee mid-scale research infrastructure projects, drawing upon its experience in the management of major multi-user research facility projects to develop appropriate approaches. However, major facilities and mid-scale projects are inherently risky because the infrastructure is one-of-a-kind and technically complex, and construction and operating costs are high. Accordingly, this area might again prove to be a management challenge for the agency in the future.

NSF has continued to demonstrate its ability to achieve its mission in an ever-changing environment. As the agency moves into FY 2024 and beyond, it is well positioned to address both familiar and new challenges it may face with acuity, agility, and adaptability.

Challenge 1: Overseeing and Managing Risks of Sexual Assault/Harassment in Antarctica

In August 2022, NSF publicly released the Sexual Assault/ Harassment Prevention and Response Final Report (SAHPR report), which it commissioned to examine sexual harassment and sexual assault in the United States Antarctic Program (USAP) community and identify corrective actions.[2] The review determined that "sexual harassment, stalking, and sexual assault are ongoing, continuing problems in the USAP community." The report highlights a concern that providing effective oversight of awardee compliance may be particularly difficult for NSF in Antarctica and its associated research vessels and field sites due to lack of trust and reporting mechanisms.

Following the release of the SAHPR report, we initiated our ongoing inspection of USAP's sexual harassment and assault prevention and response. Separately, in March 2023, our office provided NSF with a white paper detailing considerations for an effective reporting and response capability when presented with allegations of sexual assault and stalking.[3] Sexual assault cases present law enforcement challenges even under ordinary circumstances; those challenges are compounded by Antarctica's distant and sometimes inaccessible location.

KEY FACTS

- This issue involves an operation that is critical to an NSF core mission.
- NSF commissioned a report highlighting concerns about providing effective oversight of awardee compliance in the USAP due to lack of trust and reporting mechanisms.
- NSF has taken additional action, such as stationing an on-ice victim advocate, establishing a 24/7 NSF Antarctic Helpline, and making changes to the Antarctic Support Contract to require additional reporting.
- NSF has multiple actions planned for the 2023-2024 austral summer season.
- NSF is coordinating with our office, which will investigate criminal violations covered under the Special Maritime and Territorial Jurisdiction of the United States.

NSF has acted to address issues described in the SAHPR report and concerns we identified during our ongoing inspection, including during our joint audit/investigative site visit to McMurdo Station in February 2023. In the 2022-2023 austral summer season, NSF stationed an on-ice victim advocate to support sexual assault victims. In April 2023, NSF established a 24/7 helpline to provide support to members of the USAP community who experience sexual assault or sexual harassment. NSF established a Sexual Assault and Harassment Prevention and Response (SAHPR) Office to provide these resources and others, remove barriers, and provide an independent line of reporting for victims in the USAP. NSF made changes to the Antarctic Support Contract to require additional reporting on SAHPR complaints as well as imposing new requirements on prospective employees. NSF has also planned multiple actions for the 2023-2024 season.

Work remains, however, to ensure USAP participants have access to necessary reporting channels. NSF is coordinating with our Office of Investigations, which will investigate alleged criminal violations covered under the Special Maritime and Territorial Jurisdiction of the United States, including aggravated sexual abuse, sexual abuse, abusive sexual contact, and stalking. OIG special agents began responding, remotely, to concerns raised by individuals in Antarctica in July 2023, and our office is working toward having an on-site presence during future austral summer seasons.

[2] Department of the Interior's Federal Consulting Group, NSF/OPP/USAP Sexual Assault/Harassment Prevention and Response (SAHPR) Final Report, June 22, 2022

[3] NSF OIG, Law Enforcement Perspectives on Sexual Assault and Stalking Issues Pertaining to the United States Antarctic Program, March 7, 2023

Key Completed Actions

- Issued NSF Director Statement on USAP SAHPR Report and Follow-on Actions.
- Initiated NSF Action Plan in response to SAHPR report.
- Issued NSF OD-22-18, *Establishment of a Director's Task Force for Implementation of Measures to Combat Sexual Assault and Harassment in the United States Antarctic Program (USAP)* to implement the Action Plan.
- Hosted a series of listening sessions at McMurdo and virtually for current and former USAP participants to get community feedback on sexual assault/harassment prevention and reporting.
- Established SAHPR Office to provide access to resources and guidance to help prevent and address sexual assault and harassment.
- Stationed an on-ice victim advocate to support sexual assault victims in the 2022-2023 austral summer season.
- Established an NSF Antarctic Helpline to provide support to members of the USAP community who experience sexual assault or sexual harassment.
- Collaborated with NSF OIG on outreach materials for upcoming site visits to McMurdo Station.
- Met with U.S. Equal Employment Opportunity Commission and Office of Federal Contract Compliance Programs.
- Made changes to the Antarctic Support Contract to require more frequent and additional reporting on complaints, and to improve vetting procedures for potential employees.
- Formed joint NSF/NSF OIG working group to coordinate on law enforcement response.

Key Planned and Ongoing Actions

- Planning USAP Climate Survey to establish baseline data on sexual assault/sexual harassment incidence rate and culture/environment measures.
- Enacting USAP Accountability Framework, including meetings/coordination with federal and academic partners as well as contractors.
- Enhancing training including new training resources for supervisors and staff, prevention toolkit, safety planning resources, and training on how to receive and respond to a disclosure.
- Conducting on-ice, in-person outreach and education.
- Coordinating with NSF OIG on law enforcement response.

Challenge 2: Addressing Sexual Harassment in the Scientific Enterprise

A 2018 National Academies of Sciences, Engineering, and Medicine report identified that "… more rapid and sustained progress in closing the gender gap in science, engineering, and medicine is jeopardized by the persistence of sexual harassment and its adverse impact on women's careers in our nation's colleges and universities."[4] The report identified that more than 50 percent of women faculty and staff and 20–50 percent of women students encounter or experience sexual harassment in academia.[5] The *CHIPS and Science Act of 2022*, which includes findings from the 2018 National Academies report, requires NSF to examine "factors contributing to, and consequences of, sex-based and sexual harassment affecting individuals in the STEM workforce" and "approaches to reduce the incidence and negative consequences of such harassment."[6]

NSF has acted to combat harassment anywhere NSF-funded science or education is conducted, including in remote sites such as Antarctica, as previously described. NSF issued statements to the academic community that harassment will not be tolerated. It also implemented an award term and condition, effective in October 2018, requiring awardee organizations to notify NSF of findings or determinations of sexual harassment, other forms of harassment, or sexual assault by an NSF-funded Principal Investigator (PI) or any co-PI.[7]

According to its *Proposal & Awards Policies & Procedures Guide*, NSF expects all research organizations to establish and maintain clear and unambiguous standards of behavior to ensure harassment-free workplaces wherever science is conducted. Effective January 2023, for each proposal that includes research off-campus or off site, the proposing organization must complete a certification that the organization has a plan in place that describes how harassment and other abusive or unwelcome behavior at that site will be addressed. As previously

KEY FACTS

- This issue involves an operation that is critical to an NSF core mission.
- Recent reports and legislation indicate harassment is pervasive in institutions of higher education and jeopardizes more rapid and sustained progress in closing the gender gap in STEM.
- NSF has taken action, such as implementing an award term and condition about reporting harassment or sexual assault and setting expectations that research organizations establish and maintain clear and unambiguous standards of behavior.
- Harassment and sexual assault are still prevalent challenges facing the research community, and additional steps remain.
- An independent accounting firm, under a contract with our office, is evaluating whether recipient institutions' policies about harassment comply with relevant NSF policies.

[4] National Academies of Sciences, Engineering, and Medicine, Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine. Benya FF, Widnall SE, Johnson PA, editors. Washington, DC: National Academies Press (US), June 2018.
[5] Ibid.
[6] Pub. L. No. 117-167
[7] Specifically, the term and condition requires notification of (1) any findings/determinations regarding the PI or any co-PI that demonstrates a violation of organizational policies or codes of conduct, statutes, regulations, or executive orders relating to sexual harassment, other forms of harassment, or sexual assault, and/or (2) if the PI or any co-PI is placed on administrative leave or if any administrative action has been imposed on the PI or any co-PI by the organization relating to any finding/determination of an investigation of an alleged violation of grantee policies or codes of conduct, statutes, regulations, or executive orders relating to sexual harassment, other forms of harassment, or sexual assault.

discussed, NSF also established a SAHPR Office to provide access to resources and guidance to help prevent and address sexual assault and harassment.

However, harassment and sexual assault are still prevalent challenges facing the research community, and additional steps remain. In a 2023 report about NSF's vetting of individuals hired under the *Intergovernmental Personnel Act* (IPAs), we shared that only 6 of the 21 NSF-funded organizations we surveyed had policies or procedures for notifying NSF of employment status changes, such as administrative leave due to sexual harassment, as NSF requires.[8] We also reported NSF did not have a separate step in the IPA vetting process to address harassment-related issues. As a result of our audit, in October 2023, NSF will begin requiring IPAs' home organizations to notify NSF of any harassment-related findings or determinations. In September 2023, an independent public accounting firm, under a contract with us, began an engagement to evaluate whether recipient organizations' policies about harassment and/or sexual assault comply with relevant NSF terms, conditions, and policies.

As the primary source of federal academic support in many science and engineering fields, it is imperative that NSF continue working to address harassment and undertake prevention and response efforts. In addition, as outlined in its Equity Action Plan, NSF's commitment to creating a safe and inclusive environment will help advance its strategic goal of increasing participation in the STEM enterprise.[9]

Key Completed Actions

- Implemented a term and condition requiring the awardee organization to notify NSF of findings or determinations of sexual harassment, other harassment, or sexual assault.
- Established a SAHPR Office to coordinate communication, ensure matters are appropriately referred, and provide access to resources and guidance to help prevent and address sexual assault and harassment.
- Established saferscience@nsf.gov as the single point of communication on reports, complaints, or questions for the community.
- Updated the *Proposal & Awards Policies & Procedures Guide* (NSF 23-1) to require the proposing organization complete a certification that the organization has a plan for creating and maintaining safe and inclusive working environments for off-campus and off-site research for that project.
- Issued *Office of Equity and Civil Rights Bulletin No. 23-02: Sexual Harassment Reporting* to reiterate the responsibility of all NSF employees to swiftly report sexual harassment.
- Added a certification requirement that proposals that include off-campus or off-site research must also have a plan in place to address harassment and abusive behavior.
- Developed resources focused on preventing harassment, establishing effective means for reporting, and promising practices for the recipient community.
- Issued a Request for Information (RFI) to identify contract vendors for SAHPR prevention/reporting/consulting/education; conducting market research meetings with contract vendors in field of sexual misconduct prevention and response.
- Issued a "Dear Colleague Letter" (an announcement to the research community) that explicitly encourages proposals that address harassment.

[8] NSF OIG Report No. 23-2-003, Audit of NSF's Vetting Process for Individuals Assigned Under the Intergovernmental Personnel Act, January 9, 2023

[9] Ibid, and U.S. National Science Foundation, 2022-2026 Strategic Plan, Agency Equity Action Plan

Key Planned and Ongoing Actions

- Evaluating existing support services for the USAP, such as the Helpline and victim advocate, for broader use.
- Implementing a requirement for IPAs' home institutions to notify NSF of any harassment-related findings or determinations.
- Collaborating with awardees, federal agencies, and international organizations that support the research enterprise.
- Engaging with students, staff, and faculty at academic institutions on current gaps and promising practices in field research.

Challenge 3: Increasing Diversity in Science & Engineering Education and Employment

NSF, the National Science Board (NSB), the President, and Congress have prioritized increasing diversity in science, technology, engineering, and mathematics (STEM) education and employment.[10] NSF's January 2023 report, *Women, Minorities, and Persons with Disabilities 2023,* indicates that these groups remain underrepresented in STEM.[11]

The NSB issued a statement[12] on racism in science and engineering and approved an NSB-NSF commission on merit review to determine, among other things, if the existing criteria fully empowered diverse talent participation in STEM. A report from the commission is due in 2024. In June 2023, it issued a digest with trends in proposals, awards, and funding rates by self-reported information on gender, ethnicity, race, and disability.[13] Such statistics help track outcomes.

NSF posts its Broadening Participating Portfolio on its website to inform stakeholders of applicable research opportunities. It appointed a Chief Diversity and Inclusion Officer in January 2023. NSF also tracks progress in achieving its Agency Priority Goal to improve representation in the scientific enterprise.[14] In 2024, NSF is to provide to the NSB the results of two pilots to foster diversity.

KEY FACTS

- This challenge involves an operation that is critical to an NSF core mission.
- Increasing diversity in STEM is a top priority of NSF, the NSB, the President, and Congress.
- Greater participation in STEM by underrepresented groups is key to U.S. economic competitiveness worldwide and to national security.
- Women, minorities, and persons with disabilities remain underrepresented in STEM.
- The CHIPS and Science Act requires NSF to address underrepresentation in STEM.
- NSF has created an Equity Ecosystem framework to broaden participation in STEM, ensure equity in NSF program delivery, and promote diversity, equity, inclusion, and access in the NSF workforce.

In February 2023, the White House issued Executive Order (EO) 14091, which requires agencies to create an Agency Equity Team, submit an Equity Action Plan to the Office of Management and Budget, and update the plan annually.[15] NSF had already created its agency equity team and developed an Agency Equity Action Plan in response to 2021's EO 13985.[16] The Plan has five focus areas and includes methods to track progress, long-term success characteristics, and accountability procedures.

The CHIPS and Science Act also requires outreach to underserved populations and broadened participation in major research awards. The Act established targets for NSF funding to institutions in its

[10] *See* National Science Foundation, 2022-2026 Strategic Plan and NSF Diversity, Equity, Inclusion and Accessibility (DEIA) Strategic Plan 2022-2024; National Science Board, Vision 2030, May 2020; Biden-Harris, Management Agenda Vision; Relevant Executive Orders: 13985, 13988, 14020, 14035, 14091; Pub. L. No. 117-167

[11] National Center for Science and Engineering Statistics (NCSES), 2023. Diversity and STEM: Women, Minorities, and Persons with Disabilities 2023. Special Report NSF 23-315. Alexandria, VA: National Science Foundation.

[12] NSB 20-22

[13] NSB 2023-14

[14] *See* quarterly progress reports.

[15] Executive Order 14091, *Further Advancing Racial Equity and Support for Underserved Communities through the Federal Government*

[16] National Science Foundation, Agency Equity Action Plan

Established Program to Stimulate Competitive Research (EPSCoR) jurisdictions of 15.5 percent in FY 2023 increasing to 20 percent in FY 2029.

NSF has continued to prioritize its commitment to stakeholder engagement in its efforts to promote opportunities everywhere, by identifying and addressing individual, institutional, and geographic barriers to innovation, partnerships, and opportunities in STEM. NSF held listening sessions and roundtables with Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), and Tribal Colleges and Universities (TCUs). Such outreach has helped NSF engage the scientific community on equity issues at all academic levels, including students, senior scientists and engineers, educators, and administrators — all critical steps in its efforts to increase participation in the STEM enterprise.

Key Completed Actions

- Appointed a Chief Diversity and Inclusion Officer.
- Held listening sessions and roundtables with HBCUs, HSIs, and TCUs.
- Held listening sessions with Tribal Leaders.
- Included Indigenous community acknowledgments as part of its programmatic agreements for some facilities.
- Issued NSF Diversity, Equity, Inclusion and Accessibility (DEIA) Strategic Plan 2022-2024.
- Issued a Study of Anti-Harassment Policies, Guidelines, and Communications.
- Issued an EPSCoR Study.
- Initiated the Growing Research Areas for Nationally Transformative Equity and Diversity (GRANTED) program to support STEM at emerging and underserved research entities.
- Piloted Analytics for Equity Initiative.
- Submitted an Agency Equity Action Plan to the Domestic Policy Council and the Office of Management and Budget.

Key Planned and Ongoing Actions

- Implementing NSF's DEIA Strategic Plan.
- Implementing the Agency Equity Action Plan.
- Addressing recommendations in the staff-led Racial Equity Task Force Report.
- Addressing recommendations in EPSCoR reports.
- Tracking quarterly progress in achieving the Agency Priority Goal to improve representation in the scientific enterprise.
- Continuing to host listening sessions and roundtables, including on campuses of Minority Serving Institutions.
- Continuing to fund programs to increase diversity, such as the Louis Stokes Alliances for Minority Participation, Hispanic-Serving Institutions Program, Historically Black Colleges and Universities Excellence in Research, Tribal Colleges and Universities Program, and Organizational Change for Gender Equality in STEM Academic Professions (ADVANCE).
- Implementing CHIPS and Science Act requirements.
- Evaluating Merit Review as a factor in increasing diversity.

Challenge 4: Overseeing the United States Antarctic Program (USAP)

NSF, through the USAP, manages U.S. scientific research in Antarctica. Antarctica's remote location, extreme environment, and the short period of time each year during which the continent is accessible present challenges above and beyond those typically encountered for domestic science operations.[17]

KEY FACTS

- This challenge involves an operation that is critical to an NSF core mission.
- Antarctica's environment presents unique operating and contract monitoring challenges.
- The ASC is NSF's largest and most visible contract, valued at $2.3 billion over 13 years. It expires in March 2025.
- NSF is undertaking a long-range infrastructure modernization project.
- Construction was delayed and science deferred due to the onset of the pandemic and other factors. NSF will prioritize already-funded science projects as much as possible to address the backlog.
- Ensuring seasonal employees are appropriately vetted prior to deployment remains a challenge.

Closeout and Recompetition of the Antarctic Support Contract

Leidos Innovations Corporation holds the Antarctic Support Contract (ASC) for USAP logistical support. It is NSF's largest and most visible contract, valued at $2.3 billion over 13 years. Through this and other contracting vehicles, NSF is also conducting a long-range infrastructure investment program across the program, including the three U.S. Antarctic stations (McMurdo, Palmer, and South Pole). The Office of Polar Programs (OPP) monitors performance of the ASC, with several other NSF offices collaborating to manage the USAP more broadly. Managing the ASC is complex and requires a strong cost monitoring program, oversight of deliverables and deadline requirements, and appropriate consideration of risks.

The contract with Leidos Innovations Corporation as the prime contractor for logistical support expires in March 2025. Staffing changes, hiring challenges, and design errors related to the Antarctic Infrastructure Modernization for Science (AIMS) project have affected the timeline and will push some components of the project beyond March 2025. NSF has also discovered issues with Leidos' Earned Value Management System (EVMS),[18] and cannot accept its EVMS data for the AIMS project until Leidos makes necessary adjustments. These issues will need to be resolved prior to the contract closeout process. It is also imperative that NSF obtain timely audits of the ASC costs claimed to NSF by Leidos to ensure the costs claimed are allowable, allocable, and reasonable. These audits are an important part of the contract closeout process. When the contract is recompeted, NSF will need to ensure prospective audit contractors are qualified and their proposed costs are reasonable. Having sufficient, knowledgeable procurement staff to manage a procurement of this magnitude will also help NSF undertake this large procurement effort.

Construction Delays and Deferred Science

NSF paused on-site construction work for the AIMS project at McMurdo in March 2020 due to the COVID-19 pandemic, and construction personnel were not deployed to McMurdo for the 2020–2021 and 2021–

[17] Please see Management Challenge 1: Overseeing and Managing Risks of Sexual Assault/Harassment in Antarctica for more details on managing this challenge facing the USAP community.

[18] EVMS is a project management tool to measure the value of work accomplished in a given period and compare it with the planned value of work scheduled for that period and the actual cost of work accomplished. Its purpose is to integrate a project's cost, schedule, and technical efforts for management purposes and provide reliable data to decision makers.

An aurora australis over the IceCube Neutrino Observatory at the South Pole. IceCube is supported by NSF.
Credit: Yuya Makino, IceCube/NSF

2022 seasons. Construction of the Lodging Building, Vehicle Equipment and Operations Center (VEOC), and the Information Technology and Communications (IT&C) primary addition resumed in McMurdo this past 2022-2023 season. On-ice construction will continue in the 2023-2024 season with a focus on meeting near-term needs and improving critical infrastructure at McMurdo. Unfunded parts of AIMS will be considered for incorporation into the longer-term Antarctic Infrastructure Recapitalization (AIR) program portfolio of USAP infrastructure projects.

For the 2022-2023 season, delays in early-season cargo and passenger movements as well as COVID management protocols affected OPP's ability to support as much of the already-deferred projects as anticipated. For the next three field seasons (August 2023 through March 2026), NSF will prioritize already-funded science projects to the greatest extent possible to address the backlog of funded projects.

Information Security and Vetting of Contractors

NSF also continues to address recent USAP information security audit findings. These findings,[19] first identified in FY 2019, demonstrate the extended time needed to fully enact security measures for the USAP network[20] consistent with those of NSF. OPP is working to address audit recommendations related to incident logging and monitoring, as well as implementation of Personal Identity Verification (PIV) and multifactor authentication (MFA) for USAP contractors. However, due to the challenges of operating in

[19] NSF OIG Report No. 21-2-002, *Audit of NSF's Information Security Program for FY 2020*, November 20, 2020
[20] The USAP network is a government-owned, contractor-operated network that is independent and separate from the NSF headquarters network, merit review systems, and data.

this remote environment and the time necessary to implement improvements resulting from changes to USAP contracts, the USAP remains at an increased risk of negative impacts to USAP personnel, systems, and data.

In 2022, we reported that NSF did not ensure all ASC contractors were onboarded and vetted in accordance with NSF requirements; instead, NSF relied on the contractor's internal vetting processes, which are less rigorous than the minimum level of investigation.[21] Since this report, OPP has modified its process to follow federal requirements for vetting and credentialing contractors that require elevated access to USAP systems and data. NSF also issued ASC contract modifications to require the contractor's compliance with NSF vetting process. Though OPP is submitting seasonal contractors to NSF for vetting, ensuring seasonal employees are appropriately vetted prior to deployment remains a challenge.

Occupational Health and Safety

As we previously reported, Antarctica's extreme environment and relative isolation challenge human health and wellness.[22] In August 2023, we began an inspection of NSF's oversight of USAP occupational health and safety. As part of our inspection, we will assess Leidos' performance for ensuring the overall occupational health and safety for the USAP, and review policies and procedures related to food safety, fire safety, and waste management.

Key Completed Actions

- Determined the award type (contract) for the ASC replacement award.
- Corrected the VEOC design.
- Added additional resources to support the increased vetting workload.
- Implemented a Security Information and Event Monitoring capability for USAP.
- Implemented PIV credentials and enforcement for ASC contractors in the USAP Denver-based office.
- Established a more robust Acceptance of Risk program for the USAP.

Key Planned and Ongoing Actions

- Hiring a Program Manager to coordinate efforts related to entering into an agreement for Antarctic Science and Engineering Support as a follow-on arrangement to the ASC.
- Obtaining incurred cost audits of the Leidos ASC contract.
- Assessing the impacts of the VEOC construction delay.
- Monitoring AIMS via the NSF Office of the Director's Watch List.
- Prioritizing already-funded science projects to address the backlog of funded projects.
- Continuing prioritization of PIV card issuance and alternative MFA solution when PIV credentials cannot be issued.
- Ongoing monthly cybersecurity risk discussion with USAP leadership.
- Continuing efforts to meet NSF vetting requirements for contractors.

[21] NSF OIG Report No. 22-6-004, NSF Vetting of United States Antarctic Program Contractors, March 18, 2022
[22] NSF OIG Report No. 15-2-009, Audit of Health and Safety in the U.S. Antarctic Program, July 2, 2015

Challenge 5: Overseeing NSF's Funding Portfolio in a Changing Environment

The CHIPS and Science Act, enacted August 9, 2022, formally established the Technology, Innovation, and Partnerships (TIP) directorate — NSF's first new directorate in more than 3 decades — and created several new requirements for NSF related to research security, broadening participation in the research enterprise, and strengthening STEM education. It also provided NSF with the authority to use new types of award instruments.

NSF is managing these new requirements while facing an uncertain fiscal environment. The CHIPS and Science Act authorized NSF's budget to more than double within 5 years, to nearly $19 billion. The actual funding environment has been more constrained, with NSF receiving an overall budget of $9.9 billion in FY 2023 (20 percent less than what was authorized) and NSF requesting an overall budget of $11.4 billion in FY 2024 (37 percent less than what was authorized). As total appropriated funding may continue to fall short of authorized amounts, NSF will have to continue to overcome uncertainty and fiscal challenges to accomplish the various requirements of the CHIPS and Science Act.

In addition, TIP represents a transformational change to NSF's traditional mission by expanding its emphasis on applied and use-inspired research and establishing partnerships across a broad array of stakeholders, such as through its Regional Innovation Engines program (NSF Engines), which aims to grow and sustain regional innovation. Each NSF Engine can receive up to $160 million over a 10-year period to support the development of diverse regional coalitions of researchers, institutions, companies, and civil society to conduct research and development with economic and societal impacts. New award instruments, an expanded mission, and an increase — even if less than anticipated — in funding will bring inherent challenges in ensuring proper stewardship and accountability of award funds.

KEY FACTS

- This challenge involves an operation that is critical to an NSF core mission. It also presents a risk of fraud, waste, or abuse of NSF or other government assets.
- The CHIPS and Science Act formally established the TIP Directorate, created new requirements related increasing diversity in STEM, and authorized NSF to use new funding instruments.
- The Act authorized NSF's budget to more than double within 5 years, to nearly $19 billion, but to date the actual funding environment has been more constrained.
- TIP expands NSF's emphasis on applied and use-inspired research.
- NSF's Enterprise Risk Management gives NSF a way to monitor expanded risks associated with these changes.

NSF has long been successful in achieving its mission by funding promising scientific research through grants and cooperative agreements. However, with the newly granted authority to use other transaction agreements, NSF is reevaluating its processes for ensuring the consistent and proper selection of award instruments. Available award instruments include — as appropriate and consistent with law — not only grants, cooperative agreements, and other transaction agreements, but also contracts and other arrangements. The risks and challenges associated with expanding the use of alternative funding vehicles are further heightened by an increase in the expected number of award recipients without prior NSF funding history.

NSF has taken action to prepare for these challenges and position itself to manage the associated risks in an effective manner. For example, NSF's Enterprise Risk Management program provides NSF with a

Collection of a coral sample as part of a first-time study on the genetics of corals from the Northern Mariana Islands, supported in part by an NSF EPSCoR award.
Credit: Photo courtesy University of Guam

mechanism to monitor risks related to the increasing number of award recipients without prior NSF funding history and NSF's increased use of partnerships. Additionally, NSF has developed coalitions and partnerships both internally and externally to help ensure efficient and effective use of new award instruments. Managing these broad and wide-ranging risks will be critical for NSF to execute its mission effectively and continue to ensure proper stewardship and accountability of award funds.

Key Completed Actions

- NSF established the Strategy, Engagement, and Consultation Group to help meet increased funding targets for EPSCoR jurisdictions.
- NSF conducted pre-award accounting and financial capability reviews of potential Type-1 NSF Engines Development Awards recipients.
- NSF implemented new *Selection of Award Instrument* Standard Operating Guidance (SOG) to facilitate the proper selection of award instruments based on guiding authorities.
- NSF established a CHIPS and Science Executive Steering Group to focus the agency strategy and near-term implementation activities for CHIPS and Science, facilitate knowledge sharing, coordinate legislative requirements, and develop strategies for implementing CHIPS and Science Act requirements within appropriated resources.

Key Planned and Ongoing Actions

- NSF is evaluating current risk assessment and advanced monitoring site visit and desk review practices and assessing potential changes.
- NSF is using the Enterprise Risk Management process to evaluate current monitoring and oversight of award recipients, to include new awardee types.
- NSF is continuing to monitor portfolio composition and potential increases of small and mid-size award recipients, as well as emerging new partnerships.

Challenge 6: Managing Human Capital

One of the priorities of the President's Management Agenda is strengthening and empowering the federal workforce.[23] The Agenda Vision notes that to do so, federal agencies must have "high employee engagement, a commitment to respect workers' right to organize and bargain collectively, and strong systems to hire, retain, and develop the people needed to deliver agency missions."[24]

NSF has demonstrated its ability to engage its employees. Federal Employee Viewpoint Survey (FEVS) results indicate NSF continues to maintain progress in employee engagement and employee satisfaction, and according to the Partnership for Public Service, NSF is a top-five place to work in the federal government.[25]

NSF continues to evaluate how best to modernize how it works while strengthening relationships and personal interactions. In September 2023, the Office of the Director and AFGE Local 3403 jointly announced the launch of NSF's *Workspace Management Policy* and *Telework and Remote Work Policy* and expressed a joint commitment to learning and continuing dialogue as the work of implementing the new hybrid work model continues.

KEY FACTS

- This issue is related to key initiatives of the President.
- NSF continues to maintain progress in the areas of employee engagement and employee satisfaction.
- NSF, along with AFGE Local 3403, announced NSF's Workspace Management Policy and Telework and Remote Work Policy.
- NSF has strengthened its management of rotators, but risks remain given the IPA program's size and complexity.
- Significant growth in staffing levels, including in its IPA program, may challenge NSF's ability to hire, vet, and onboard staff efficiently and effectively.

Another defining characteristic of NSF's human capital management strategy continues to be its use of temporary staff, which includes both those brought on through authority provided by the *Intergovernmental Personnel Act*, known as IPAs, and those employed through NSF's own Visiting Scientist, Engineer, and Educator (VSEE) program. These individuals — referred to as IPAs or rotators — bring fresh perspectives from all fields of science and engineering to support NSF's mission.

NSF has taken action to respond to the findings and recommendations that we identified in our 2023 report titled *Audit of NSF's Vetting Process for Individuals Assigned Under the Intergovernmental Personnel Act.*[26] We reported that NSF did not always ensure IPA candidates met all program eligibility requirements or verify IPAs' salary and employment history prior to assignment, and did not update its personnel security and suitability review process to address risks associated with foreign influence. NSF has taken, and continues to take, corrective action to address the report's recommendations. Appropriately administering and monitoring its rotating workforce remains an ongoing risk within NSF's broader human capital management plan, given the program's size and complexity.

In addition, NSF updated its policy on administratively determined (AD) pay bands in September 2023 after confirming with the Office of Personnel Management and the U.S. Department of Justice that NSF's

[23] Workforce Priority | President's Management Agenda | Performance.gov
[24] *See* President's Management Agenda and Strengthening and Empowering the Federal Workforce
[25] National Science Foundation, Federal Employee Viewpoint Survey (FEVS) Results
[26] OIG Report No. 23-2-003, January 9, 2023

AD pay bands are subject to the pay limitations contained in 5 U.S.C. § 5373, and that NSF's pay levels exceeded the statutory cap on basic pay with locality. In January 2024, NSF will make adjustments for any position over the Executive Level III max, and no new hires as of September 2023 will be above the statutory cap.

Lastly, NSF has established systems for hiring, retaining, and developing people; however, it is experiencing growth in staffing levels, which may challenge its ability to hire, vet, and onboard staff in an effective, efficient manner. In NSF's FY 2024 Budget Request to Congress, the total number of federal employees was expected to increase from 1,516 in FY 2022 to 1,651 in FY 2023, a 9 percent increase.[27] NSF also estimated an increase in IPAs from 214 full-time equivalents to 267, a 25 percent increase, between FY 2022 and FY 2023. NSF will have to adeptly manage the operational and managerial challenges such growth can introduce.

NSF Headquarters in Alexandria, VA.
Credit: Maria B. Barnes/NSF

Key Completed Actions

- Issued Workspace Management Policy and Telework and Remote Work Policy.
- Held virtual office hours to inform and engage staff to discuss new hybrid model of work.
- Initiated corrective actions related to NSF OIG audit report on vetting of IPAs.
- Issued OD 23-17, *Update on Administratively Determined Pay Bands*.

Key Planned and Ongoing Actions

- Continuing to engage with AFGE Local 3403 and employees on the hybrid work environment and related policies.
- Continuing to complete corrective actions related to NSF OIG audit report on the vetting of IPAs.

[27] National Science Foundation, NSF FY 2024 Budget Request to Congress

Challenge 7: Mitigating Threats to Research Security

Safeguarding the U.S. research enterprise from threats of inappropriate foreign influence continues to be of critical importance. Although significant challenges remain, U.S. funding agencies and academia have made progress in combating malign foreign influence, while maintaining an open research environment that fosters collaboration, transparency, and the free exchange of ideas.

NSF, and other agencies that fund research, continue to face challenges from foreign talent recruitment programs. According to the Office of Science and Technology Policy, a foreign government-sponsored talent program is an effort directly or indirectly organized, managed, or funded by a foreign government to recruit science and technology professionals in targeted fields. Nondisclosure of relationships with any such program adversely affects NSF decision-making on proposals. Although some of these programs are legitimate, many encourage or direct unethical and criminal behaviors, including the deliberate nondisclosure of the recruit's foreign position and associated foreign scientific funding. Agreements for participation in some programs include language that creates conflicts of commitment and/or conflicts of interest for researchers, such as requirements to attribute U.S.-funded work to a foreign institution; recruit or train other talent recruitment program members; circumvent merit-based processes; and replicate or transfer U.S.-funded work to another country.

KEY FACTS

- The issue presents risk of fraud, waste, and abuse of NSF or other government assets.
- Federal agencies and academia have made progress in combating malign foreign influence on the U.S. research enterprise.
- NSF has worked to mitigate these threats, such as by releasing guidelines for strengthening research security and creating an Office of the Chief of Research Security Strategy and Policy.
- NSF also has expanded research security training and educated the research community.

A visible laser used to study semiconductor properties close-up.
Credit: Georgia Tech/Rob Felt

Over the past 5 years, NSF has taken meaningful action to mitigate threats posed by these programs. It strengthened disclosure requirements and provided compliance recommendations to U.S. academic institutions to ensure accurate disclosures to U.S. funding agencies. Further, NSF created an Office of the Chief of Research Security Strategy and Policy, which has taken a leading role in federal government efforts to combat this threat. It has expanded research security training and educated the research community through domestic and international outreach. NSF should continue to assess and refine its controls in this area and ensure that it has sufficient staff and resources to address this challenge.

Key Completed Actions

- Created a Chief of Research Security Strategy and Policy position, later codified in the CHIPS and Science Act.
- Created a Chief Data Officer position.
- Launched the Research Security Strategy and Policy Group; developed and implemented research security data analytics capability that captures nondisclosure of foreign affiliations, sources of funding, and collaborations that present conflicts of commitment or capacity.
- Communicated an express prohibition of Foreign Talent Plan membership for all NSF staff, including rotators, and contributed to the process of vetting incoming rotators.
- Developed and implemented mandatory research security training for staff and rotators in direct communication with recipient organizations and principal investigators.
- Educated the research community about risks and compliance with NSF's policies and procedures.
- Strengthened disclosure requirements and processes, including implementing two new vehicles for submitting post-award information.
- Revised term and condition for foreign collaboration considerations in major facilities.
- Developed and implemented an award term and condition for previously undisclosed information.
- Served as steward of the development of harmonized disclosure requirements for proposers and grantees that have been adopted by the U.S. government interagency community.
- Increased collaboration with NSF OIG, U.S. government agencies, and other relevant stakeholders.
- Solicited input on the Research Security and Integrity Information Sharing Analysis Organization (RSI-ISAO), as required by the CHIPS and Science Act.
- Developed internal guidance and public-facing guidelines on research security data-related practices.

Key Planned and Ongoing Actions

- Stand up the Research Security Liaison group, which will oversee many of the issues previously assigned to the Research Security Strategy and Policy Group.
- Establishing the statutorily mandated SECURE Center (also known as RSI-ISAO) as a clearinghouse for information to empower the research community to identify and mitigate foreign risks to the U.S.-funded research enterprise.
- Capturing nondisclosure of foreign affiliations, sources of funding, and collaborations that present conflicts of commitment or capacity.
- Continuing to conduct and monitor mandatory research security training for staff and rotators in direct communication with recipient organizations and principal investigators.
- Continuing education of the research community about risks presented by foreign talent recruitment programs and the importance of compliance with NSF policies and procedures.
- Implementing harmonized disclosure requirements for proposers and grantees that have been adopted by the U.S. government interagency community.
- Maintaining collaborative relationships with NSF OIG, U.S. government agencies, and other relevant stakeholders.
- Developing guidelines for strengthening research security, including those required by the CHIPS and Science Act and National Security Presidential Memorandum 33.
- Developing online research security training modules that will be made publicly available through awards made in partnership with National Institutes of Health, the Department of Energy, and the Department of Defense.
- Developing the Research-on-Research Security Program with international partners.

Challenge 8: Mitigating Threats Posed by the Risk of Cyberattacks

Federal agencies need information technology (IT) systems and electronic data to carry out operations and to process, maintain, and report essential information. The security of these systems and data is vital to public confidence and national security, prosperity, and well-being.

KEY FACTS

- This issue involves an operation that is critical to an NSF core mission.
- The security of IT systems and data is vital to NSF's mission and continued funding of scientific research.
- NSF continues to make progress on improving IT security and implementing ZTA, but new cybersecurity risks remain.
- Growing use of personal devices that connect to the NSF network may increase security risks.

NSF continues to make progress on improving the security of its data and systems and implementing a Zero Trust Architecture (ZTA) in response to EO 14028.[28] ZTA is an approach to cyber security which seeks the vigorous use of modern technology and security practices to defend against the current threat environment. Malicious actors target federal technology infrastructure, threatening public safety and privacy, damaging the American economy, and weakening trust in government.

In July 2023, two federal agencies were the target of an attack against their Microsoft 365 email cloud environments. Microsoft found approximately 25 organizations, including multiple government agencies, were affected by this targeted attack against cloud-based email accounts. In response, the U.S. Department of Homeland Security's Cybersecurity & Infrastructure Security Agency (CISA) and the Federal Bureau of Investigation strongly urged agencies to implement the logging recommendations in a July 2023 CISA alert to enhance their cybersecurity posture and position themselves to detect similar malicious activity.

Our *Federal Information System Modernization Act of 2014* (FISMA) audits have found that NSF has an effective information security program under current standards.[29] NSF could enhance its cybersecurity defenses by fully implementing the use of PIV or alternative MFA cards; implementing security controls related to untrusted removable media devices; ensuring all contractors adhere to the NSF screening process; and completing the annual recertification process for its service accounts. Finally, the Microsoft attack highlights the importance of NSF's audit logging, log retention, and log management as part of its Security Information and Event Management capabilities.[30]

In addition, new cybersecurity risks remain on the horizon. For example, recent developments in quantum computing have created threats to long-trusted public key cryptography. Decryption that used to take traditional supercomputers more than 2 days can now be accomplished by quantum computers in about 3 minutes. The U.S. Department of Homeland Security has provided guidance to agencies to begin preparing for a transition to post-quantum cryptography, and federal guidance from the National Institute of Standards and Technology is forthcoming.[31] The quantum transition will take place over the

[28] Improving the Nation's Cybersecurity, May 12, 2021
[29] Pub. L. No. 113-283
[30] OMB M-21-31, Improving the Federal Government's Investigative and Remediation Capabilities Related to Cybersecurity Incidents, August 27, 2021
[31] See Policy Directive 140-15, September 17, 2021, and National Institute of Standards and Technology, Preliminary Draft NIST SP 1800-38A, Migration to Post-Quantum Cryptography, April 24, 2023

next 10 to 15 years, and the federal government is working towards the future of post-quantum cryptography. NSF could further prepare for this transition by identifying critical data and cryptographic technologies, and prioritizing systems for replacement based on mission requirements.

With the large-scale increase in NSF's resources and staffing authorized by the CHIPS and Science Act, as well as more personal devices are accessing NSF resources due to the post-pandemic shift to hybrid workspaces, NSF will need increasingly effective measures to protect its data. As its workforce grows and workplace environments change, NSF should determine if changes or enhancements are needed to its VPN and Virtual Desktop Infrastructure capabilities to improve the availability, integrity, and confidentiality of NSF data. In anticipation of significant growth, NSF is creating a new office led by a new executive who will serve as NSF's Chief Information Officer and Chief Technology Officer. NSF seeks to position its IT functions to work even more effectively and efficiently throughout the agency. However, the structure of the new office is not yet finalized, and future challenges may be associated with staffing changes, reorganization, and growth.

Key Completed Actions

- Worked with the U.S. Department of Justice's Cybersecurity Shared Services Program to obtain Security Information and Event Management capability for the USAP network.
- Updated password policy to align with ZTA; continues to use the principles of ZTA in cloud planning efforts to strengthen data protection, access controls, and application boundaries.
- Made significant strides in moving IT systems and services to the cloud to modernize legacy technology, improve capacity and uptime, enable standardization of services, and leverage the security benefits of cloud-based infrastructure.
- Automated the annual recertification process for its Active Directory service accounts to help mitigate the risk that unnecessary service accounts remain within IT environments.
- Completed an inventory of high value assets and systems critical to its mission that use cryptographic algorithms; NSF will transition to post-quantum cryptography for standardization, implementation, and testing of replacement products where vulnerable cryptographic algorithms are identified.
- Implemented a solution to block all removable media and only allow authorized removable media after security review and confirmation for the USAP network.

Key Planned and Ongoing Actions

- Updating password enforcement to align with ZTA to implement enterprise tools to check passwords against known-breached data and dictionary words.
- Implementing an endpoint management platform to only allow authorized removeable media to be used on NSF managed devices and will update the rules of behavior to inform staff to use only authorized NSF storage devices.
- Prioritizing PIV card implementation for USAP users and deploy necessary resources to fully implement PIV authentication for privileged or administrator level access to the USAP network.
- Implementing an MFA smart card solution for USAP contractors who do not receive a PIV card.
- Continuing to implement procedures and a formal monitoring program to screen USAP's full-time and seasonal staff before access is granted to the USAP network.
- Enhancing its monitoring and alerting tools as part of its incident response capabilities for the USAP network.

Staff Acknowledgments

Key contributors to this report include Theresa Hull (Assistant Inspector General for Audits), Elizabeth Argeris Lewis (Executive Coordinator and Communications Analyst), Ken Chason, Jessica Elkins, Heather Gallagher, Javier Inclán, Elizabeth Kearns, Ken Lish, Melissa Woolson Prunchak, Laura Rainey, Jennifer Springmann, Kelly Stefanko, Megan Wallace, Emily Woodruff, and Vashti Young.

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* (5 USC 401-24). Because the Inspector General reports directly to the National Science Board and Congress, the Office is organizationally independent from the Foundation.

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- For general inquiries about reporting fraud, waste, and abuse: Email oig@nsf.gov

Contact the NSF Antarctic Helpline

The NSF Antarctic Helpline provides 24/7 crisis intervention and emotional support as well as information about support resources for members of the USAP community who experience sexual assault and/or sexual harassment.

- Confidential Helpline: 1-833-673-1733
- Learn more: https://www.nsfantarctichelpline.org/

National Defense Authorization Act (NDAA) General Notification

Pursuant to Pub. L. No. 117-263 § 5274, business entities and non-governmental organizations specifically identified in this report have 30 days from the date of report publication to review this report and submit a written response to NSF OIG that clarifies or provides additional context for each instance within the report in which the business entity or non-governmental organizations is specifically identified. Responses that conform to the requirements set forth in the statute will be attached to the final, published report.

If you find your business entity or non-governmental organization was specifically identified in this report and wish to submit comments under the above-referenced statute, please send your response within 30 days of the publication date of this report to OIGPL117-263@nsf.gov, no later than December 15, 2023. We request that comments be in .pdf format, be free from any proprietary or otherwise sensitive information, and not exceed two pages. Please note, a response that does not satisfy the purpose set forth by the statute will not be attached to the final report.

National Science Foundation
Office of the Director

MEMORANDUM

DATE: October 20, 2023

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

FROM: Dr. Sethuraman Panchanathan, Director, National Science Foundation

SUBJECT: Acknowledgment of the Inspector General's Fiscal Year (FY) 2024 Management Challenges Report and Transmittal of NSF's Progress Report for the FY 2023 Management Challenges

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In FY 2023, Congress appropriated $9.9 billion to NSF, reflecting the largest dollar increase in funding in NSF's history and the largest percentage increase in more than two decades. This historic investment reflects the value of our work to accelerate technology, safeguard U.S. investments through enhanced research security, strengthen the discovery ecosystem, and invest in the U.S. STEM research and development and workforce enterprise to unleash opportunities for everyone and innovation everywhere. I am honored to lead the agency in delivering on these challenging goals while elevating the importance of risk management and sound financial management to properly steward our resources.

The statutorily required report on Management Challenges that Office of Inspector General (OIG) issues annually illustrates both the obstacles NSF faces in achieving its mission and vision, such as threats to research security and cyberattacks, as well as the strong processes the agency has in place to appropriately manage risk. The attached Progress Report for OIG Management Challenges for Fiscal Year (FY) 2023 outlines many of these processes and expresses our continued commitment to address challenges going forward, including in response to the FY 2024 OIG Management Challenges that your office shared October 13, 2023:

- Overseeing and Managing Risks of Sexual Assault/Harassment in Antarctica
- Addressing Sexual Harassment in the Scientific Enterprise
- Increasing Diversity in Science & Engineering Education and Employment

- Overseeing the United States Antarctic Program (USAP)
- Overseeing NSF's Funding Portfolio in a Changing Environment
- Managing Human Capital
- Mitigating Threats to Research Security
- Mitigating Threats Posed by the Risk of Cyberattacks

In FY 2024, NSF will continue its strong performance in oversight and management of awards, extending this experience to the oversight and management of new award instrument types. We will continue our strong track record of effective cybersecurity through implementation of measures to protect sensitive data from the threat of cyberattacks and build upon the solid foundation of actions to promote research security. In addition, NSF will devote focus to continued improvement in areas such as increasing diverse representation in science and preventing sexual assault and harassment. Among my highest priorities for NSF are creating opportunities everywhere, and ensuring a safe, harassment-free workspace and collegial culture in which research can thrive.

As always, NSF remains committed to serving the research community effectively, to continually improving stewardship across the agency, and to safeguarding 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.

/s/
Sethuraman Panchanathan

Attachments

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

National Science Foundation (NSF)
FY 2023 Progress Report on OIG Management Challenges

Summary of OIG's Management Challenge 1: Increasing Diversity in Science and Engineering Education and Employment

- There is synergy and alignment among NSF, the National Science Board (NSB) and broadly across the federal government in identifying Challenge #1 as a high priority goal.
- Challenge #1 is a focus area and is closely aligned with NSF's mission.
- In FY 2023, NSF plans to increase investments in underfunded Established Program to Stimulate Competitive Research (EPSCoR) jurisdictions.
- NSF is implementing strategies to bolster the research capacity of emerging research institutions.

NSF Management's Overview and Action Plan

NSF Leads: Alicia Knoedler, Office Head, Office of Integrative Activities; James Moore, Assistant Director, Directorate for STEM Education

Innovations in science and engineering education and the broader STEM enterprise are informed by the lived experiences, cultural differences, and varying perspectives of the people represented in the STEM workforce. In efforts to improve the representation of women, racial and ethnic minorities, and persons with disabilities in STEM learning, career development, and advancement, NSF has implemented a multi-level, systemic approach to realize an inclusive STEM workforce. The visionary leadership of the NSF Director serves as the primary driver for addressing this Management Challenge and resulted in the NSF Equity Ecosystem framework. The framework organizes equity-related activities, along three lines of effort: broadening participation in STEM, ensuring equity in NSF program delivery, and promoting DEIA within the NSF workforce. Additionally, it enables the agency to leverage shared knowledge and decades of broadening participation research and practice to impact equity and achieve demonstrable outcomes.

NSF's Completed Actions to Address the Challenge

NSF's ongoing efforts for making positive impacts in increasing diversity in science and engineering education and employment have included: (1) maintaining and updating the NSF portfolio of broadening participation (BP) programs; (2) increasing the diversity of scientists and other STEM experts who review NSF proposals; (3) providing training for staff and the larger community on NSF BP/diversity, equity, inclusion, and accessibility (DEIA) priorities and relevant policies; (4) identifying and communicating BP promising practices; and (5) strengthening the accountability and tracking of NSF-supported BP/DEIA efforts.

The NSF OIG recently highlighted several key completed actions: (1) issuance of the agency strategic plan for 2022-2026 with its first goal, "to promote inclusion in the research community and STEM workforce, access to STEM learning and training and widespread STEM literacy; (2) release of the report of the staff-convened Racial Equity Task Force, including recommendations to increase racial equity among NSF staff and across the external research community; (3) issuance of the NSF's Diversity, Equity, Inclusion and Accessibility (DEIA) Strategic Plan 2022-2024; and (4) the expansion of NSF Eddie Bernice Johnson INLCUDES Initiative.

Demonstrated Progress Through Agency Actions Taken in FY 2023

- In line with requirements of the CHIPS and Science Act, NSF created the Chief Diversity and Inclusion Officer position to improve the coordination and oversight of the agency's efforts to broaden participation in STEM and lead the agency in the implementation of the 2022-2024 DEIA Strategic

Plan[1], DEIA Implementation Plan, and Measures of Effectiveness and Analytical Tools (Maturity Model and Under-representation Framework).

- NSF developed a new research capacity initiative called GRANTED (Growing Research Access for Nationally Transformative Equity and Diversity) and issued funding opportunities (NSF 23-037 Dear Colleague Letter[2] and NSF 23-221Y Program Description[3]).
- NSF Directorates developed new funding opportunities to diversify the STEM workforce (e.g., Cultural Transformation in the Geoscience Community – NSF 23-539; Translation, Innovation and Partnerships (TIP) Enabling Partnerships to Increase Innovation Capacity – NSF 23-528; Mathematical and Physical Sciences Ascending Postdoctoral Research Fellowships – NSF 23-501).
- NSF provides regular updates to the NSB about the Agency Priority Goal, "Improve representation in the scientific enterprise," which focuses on increasing the diversity of investigators and institutions submitting proposals to NSF.
- NSF has piloted including broader impacts experts on the Committees of Visitors panels.
- In response to the OIG's Report No. 22-6-003, "Remote Versus In-Person Merit Review Panels," NSF identified and implemented solutions to improve merit review panelist demographic data.
- In response to Executive Order 14091, Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government, NSF submitted the 2023 Equity Action Plan to the White House Steering Committee on September 11, 2023.

NSF's Planned and Ongoing Actions

NSF will continue to leverage the internal communities of practice to discuss new endeavors, such as the Equity Ecosystem, as well as to develop strategies for responding to recommendations in the various BP/DEIA reports (e.g., reports from the Committee on Equal Opportunities in Science and Engineering (CEOSE) and NSB; reports of the National Academies of Science, Engineering, and Medicine). Specific ongoing actions:

- Implementing the DEIA strategic plan and identifying actionable metrics for assessing progress. The Chief Diversity and Inclusion Officer (CDIO) will develop strategies to improve outreach to and engagement with minority serving institutions, promote diversity and inclusion in PreK-12 STEM education and increase recruitment from untapped locations and underrepresented populations.
- Assessing the recommendations identified in the staff-led Racial Equity Task Force's report.
- Increasing and diversifying external engagements with underrepresented communities and emerging research institutions, particularly minority-serving institutions and those institutions located within EPSCoR jurisdictions.
- Promoting the NSF theme of *creating opportunities everywhere.* Analyzing and reporting status updates on the Agency Priority Goal.[4]
- Responding to the CEOSE theme of *making visible the invisible* by highlighting new BP programs and activities, such as the Directorate for Social, Behavioral, and Economic Sciences' emphasis on "Diversifying Diversity," and the Directorate for Geosciences' support for developing Belonging, Access, Justice, Equity, Diversity, Inclusion – Be A JEDI – leaders, as well as the new conceptual frameworks for the NSF's Equity Ecosystem and GRANTED.
- Facilitate cross agency discussions to leverage the depth of NSF experience on BP.

[1] The DEIA Strategic Plan is available at https://www.nsf.gov/od/oecr/reports/DEIA_Strategic_Plan_2022.pdf
[2] The Dear Colleague Letter for GRANTED may be accessed at https://nsf.gov/pubs/2023/nsf23037/nsf23037.jsp.
[3] The Program Description for GRANTED may be accessed at https://new.nsf.gov/funding/opportunities/growing-research-access-nationally-transformative-0
[4] NSF reports quarterly on the Agency Priority Goal at https://www.performance.gov/agencies/NSF/apg/goal-1/

Summary of OIG's Management Challenge 2: Overseeing the United States Antarctic Program (USAP)

- The Antarctic Support Contract (ASC) is NSF's largest and most visible contract, valued at $2.3 billion over 13 years.
- Due to COVID-19, construction at McMurdo under the Antarctic Infrastructure Modernization for Science (AIMS) project and the Information Technology and Communications (IT&C) primary addition was put on hold.
- Recent information security audit findings have identified challenges.
- NSF commissioned a sexual assault and sexual harassment risk assessment in the USAP environment.

NSF Management's Overview and Action Plan

NSF Lead: James Ulvestad, Acting Director, Office of Polar Programs

Antarctica's remote location, extreme environment, and the short period of time each year during which the continent is accessible present challenges above and beyond those typically encountered for domestic construction projects and science operations. COVID-19 dramatically increased these challenges. USAP's recovery from two seasons of drastic curtailment of activity during the pandemic is now underway. Science teams are returning to the field, delayed construction work has resumed, and our approach to managing COVID-19 has shifted with the end of the public health emergency declaration. To provide effective government oversight of these activities, the Antarctic Infrastructure and Logistics Section continues to mature financial management, performance monitoring, and planning processes.

Regarding information security, USAP has been working towards modernizing its processes, resources, and tools following a period of less-than-adequate investment. Some of these efforts have included a monthly cybersecurity risk discussion with USAP leadership that is based on formal metrics with trend analysis, a more robust Acceptance of Risk program, addition of technical resources to support government oversight of contractor performance, implementation of personal identity verification (PIV) credentialing, and increased rigor in vetting of elevated risk contractors.

In addition, the Office of Polar Programs (OPP) and the Office of Equity and Civil Rights (OECR) have joined forces to make a major push towards a robust Sexual Assault and Harassment Prevention and Response (SAHPR) program. Guided by leadership commitment and action from the highest levels, OPP and OECR have made combating these challenges a priority; the Office of the Director has made this issue a priority not only in USAP but across NSF.

NSF's Completed Actions to Address the Challenge

Management of COVID-19 in the FY 2023 season shifted to one of managing the illness rather than preventing all cases of the virus. That shift was challenging, and several changes to the USAP approach were made to accommodate emerging information as deployers moved onto the continent.

OPP accepted a new AIMS project baseline following an external panel review and an independent cost assessment by the US Army Corps of Engineers. Construction on that project and the IT&C primary addition resumed in the FY 2023 season. While significant progress was made, workforce shortages impacted the schedule on both activities.

OPP has been implementing multiple information security improvements, including improved audit logging capability to support Security Information and Event Monitoring tools; documented an Acceptance of Risk and Corrective Action Plan for contractor vetting concerns identified by the OIG, and cleared the backlog of over one hundred contractors in elevated risk positions requiring NSF adjudication; and achieved Initial and

Final Operating Capability for enforcing PIV credentials in the Denver-based offices of the Antarctic Support Contractor and at NSF's interagency partner, NIWC.

Demonstrated Progress Through Agency Actions Taken in FY 2023

Actions noted above on construction, COVID-19 management, and information security are continuing; however, a major focus this year has been improving the SAHPR program not only for USAP but also across the Foundation. See further discussion of SAHPR progress under OIG Management Challenge 8: Addressing Harassment in the Academic Community. Specifically, for USAP:

- This year NSF implemented more than 60 bystander intervention training sessions that reached over 1,200 deployers. Those sessions focused on scenarios tailored to the USAP environment. NSF also provided season-long reminders of that information through message boards and emails.
- NSF held both in-person listening sessions at McMurdo and a series of virtual listening sessions open to all current and former USAP community members. Special sessions were reserved for Palmer and ships, South Pole, individuals who experienced sexual assault in the USAP program, and early career individuals.
- NSF deployed a confidential, on-ice victim advocate (also available for off-ice deployers via telephone and email) and extended that service virtually through the winter season. The victim advocate is available to provide confidential support, safety planning, and advocacy to the USAP community on issues related to sexual harassment and assault.
- To increase NSF's oversight of incidents of sexual misconduct, the agency made changes to the Antarctic Support Contract to require additional reporting on contractor investigations of sexual misconduct.
- NSF established enhanced screening requirements for NSF contractors.
- NSF added SAHPR intranet pages at the stations which provide easy access to key documents and contact information in one place, including the victim advocate contact information to the "emergency contacts" page on the intranet and on postings around station.
- NSF deployed a 24/7 Antarctic Helpline to provide support to members of the USAP community who experience sexual assault or sexual harassment.[5]
- NSF increased the number of satellite communication devices for all field teams to improve access to the counselor, advocate, and other support systems for individuals working in the field camps.
- NSF provided the tools necessary to ensure lodging room doors can be locked from the inside and the outside at every station.

NSF's Planned and Ongoing Actions

- A comprehensive USAP climate survey will be disseminated in the coming months.
- OPP is finishing the addition of door viewers in all lodging rooms.
- OPP and the Personnel Security and Suitability Team in the Division of Administrative Services continue efforts to transition to enhanced screening procedures for contractors.
- Additional training is being developed for next season to expand SAHPR prevention efforts.

[5] The website for the helpline is available at https://nsfantarctichelpline.org/

Summary of OIG's Management Challenge 3: Overseeing Grants in a Changing Environment

The CHIPS and Science Act formally codifies into law the Technology, Innovation and Partnerships Directorate, requires significant expansion of programs aimed at increasing diversity in STEM, and authorizes NSF's budget to more than double within five years, to nearly $19 billion.

NSF Management's Overview and Action Plan

NSF Lead: Janis Coughlin-Piester, Office Head and CFO, Office of Budget, Finance, and Award Management

The CHIPS and Science Act of 2022 (CHIPS) authorizes NSF's budget to more than double over 5 years to nearly $19 billion to support and further enable NSF's three pillars of inspiring the missing millions, strengthening the established NSF, and accelerating technology and innovation. CHIPS formally codifies into law the Directorate for Technology, Innovation and Partnerships (TIP) to advance research and development, technology development, and related solutions to address national societal, national, and geostrategic challenges. CHIPS also encourages NSF to continue ongoing efforts to increase the level and diversity of participation in STEM education and increase the diversity of NSF grant recipients, including increased targets for the EPSCoR program. To support the vision outlined in CHIPS, significant investments are required. In FY 2023, NSF received $9.9 billion, which included approximately $1 billion in additional funding for TIP and other programs. Of this additional funding, $335 million was specifically appropriated to support CHIPS implementation. However, future appropriated funds might not match authorized amounts, creating fiscal uncertainty and challenges in meeting some of the Act's goals. NSF must continue to adapt to effectively manage this complex and changing environment over the next several years.

This dynamic and evolving environment requires a strategic and methodical assessment of the current award oversight and control environment. NSF is committed to continuing to provide exceptional stewardship over its federal grant funds while keeping pace with anticipated growth. In FY 2023, NSF established a CHIPS and Science Executive Steering Group to focus the agency strategy and near-term implementation activities for CHIPS, facilitate knowledge sharing, coordinate legislative requirements, and develop strategies for implementing CHIPS requirements within appropriated resources.

In addition, NSF's Enterprise Risk Management (ERM) and award monitoring programs provide a strong foundation for the agency to address emerging risks. NSF anticipates potential changes to its award portfolio composition, for example, through inclusion of awardees without prior NSF funding history. The Foundation's strong ERM foundation enables NSF to agilely monitor potential changes to its portfolio composition to mitigate the risk of fraud or mismanagement of federal funds. NSF's ERM activities and other concurrent efforts throughout the Foundation are currently assessing the risk and control environment related to emerging partnerships and new recipient communities to either confirm controls are operating effectively or recommend appropriate controls for new processes or award instruments. For example, in FY 2023, NSF issued a TIP Broad Agency Announcement for the NSF Regional Innovation Engines (NSF Engines) program. The intent of this program is to support the development of diverse regional coalitions of researchers, institutions, companies, and civil society that in turn accelerate advances in key technologies; solutions to pressing national, societal, and geostrategic challenges; regional workforce development; and economic growth and job creation. To manage potential risks associated with new awardees in this program, NSF issued special terms and conditions that established additional monitoring and controls, including grantee reporting requirements prior to NSF release of funds. NSF's planned FY 2023 ERM activities include creating an inventory of existing fraud risk prevention and detection activities, assessing key fraud risks, and identifying opportunities to improve fraud risk mitigation efforts. NSF is also developing coalitions with other federal entities to exchange information, lessons learned, and best practices about the

use of new award instruments. To inform these interagency discussions, NSF first conducted internal roundtable discussions to better understand the nuances and challenges in implementing and using these new award instruments.

NSF continues to monitor its investments in EPSCoR states, emerging research institutions, minority-serving institutions, and STEM education to optimize the use of its existing resources for meeting participation goals. One way NSF is tracking progress is through its Agency Priority Goal, "Improve representation in the scientific enterprise." To provide full transparency into these enhanced participation targets, NSF deployed an enterprise dashboard[6] to measure a set of key metrics around increasing proposals received with principal investigators from groups underrepresented in STEM, and from underserved institutions by 10 percent over FY 2020 baselines. NSF will continue to monitor these metrics and others related to leveraging CHIPS and its associated resources to expand access and inclusion in STEM along individual, institutional, and geographic lines.

NSF's Completed Actions to Address the Challenge

Demonstrated Progress Through Agency Actions Taken in FY 2023

- Established the Strategy, Engagement, and Consultation Group to help meet increased funding targets for EPSCoR jurisdictions.
- Provided pre-award business assistance, reviewed accounting and financial capability, and held Office Hours to outline the payment process for new Type-1 NSF Engines Development Awards recipients.
- Implemented new *Selection of Award Instrument* Standard Operating Guidance (SOG) to facilitate the proper selection of award instruments based on NSF authorities and guiding statute. NSF briefed the SOG to the OIG in April 2023.
- Issued draft 2024 Proposal & Award Policies & Procedures Guide (PAPPG) guidance which outlined specific research security requirements and other provisions required in CHIPS.

NSF's Planned and Ongoing Actions

- Evaluate current risk assessment and advanced monitoring site visit and desk review practices and assess potential changes.
- Use ERM process to evaluate current monitoring and oversight of award recipients, to include new awardee types.
- Conduct triennial FY 2024 Payment Integrity and Information Act (PIIA) risk assessment.
- Continue progress on the Project Reporting Improvement Team (PRIT) initiative to develop solutions for improving compliance on the timely submission of grant project reports across the agency.
- Continue to monitor portfolio composition and potential increases of small and mid-size award recipients, as well as emerging new partnerships.

[6] Agency Priority Goal dashboard https://tableau.external.nsf.gov/views/AgencyPriorityGoal/APGInvestigatorsGoal?%3Aembed=y&%3B%3AisGuestRedirectFromVizportal=y

Summary of OIG Management Challenge 4: Managing the Intergovernmental Personnel Act (IPA) Program

- IPAs or rotators are non-federal employees who temporarily serve as NSF staff on detail.
- IPAs bring fresh perspectives but may have a higher risk of conflicts of interest because most come from institutions receiving NSF-funded awards.
- Our ongoing audit work has found challenges with the IPA vetting and hiring process. In response, NSF established a working group to improve the vetting of IPAs.

NSF Management's Overview and Action Plan

NSF Leads: Sylvia Butterfield, Acting Assistant Director, Directorate for Social, Behavioral and Economic Sciences; Wonzie Gardner, Office Head and Chief Human Capital Officer, Office of Information and Resource Management

NSF's scientific community and the American public benefit from the regular influx of science and engineering expertise available through the IPA program. NSF takes a proactive approach in the management of the IPA program to appropriately consider and mitigate inherent risks associated with its execution. The IPA Steering Committee is charged with ensuring NSF is best utilizing the IPA hiring authority. It advises the agency'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 NSF Director and Chief Operating Officer, the Office of Management and Budget (OMB), and Congress.

NSF monitors the use of IPA assignments via an annual review of metrics related to participation, demographic characteristics, annual costs, and cost share value, which is provided to NSF leadership. Analyses of these data have demonstrated positive trends in increasing demographic diversity and reductions in annual costs. In FY 2022, NSF saved $3.3 million in costs by using the IPA program to fill key scientific positions when compared to the average Federal rate for salary and fringe benefits.

NSF has taken steps to ensure the IPA program fully supports the mission of the agency and the nation's interests. NSF has addressed the management challenges identified by the OIG as well as other agency-identified risks and challenges by actively engaging with stakeholders to implement the agency's action plan on re-entry of the IPA workforce, cost controls, turnover lifecycles, security concerns related to Malign Foreign Talent Programs, and overall vetting process improvements for IPAs. NSF is continuously improving its management of the IPA program and participation in the Independent Research and Development (IR/D) program. Indeed, NSF believes that the steps taken to date have reduced the inherent risk substantially, such that the residual risk is acceptable to the agency.

NSF's Completed Actions to Address the Challenge

Demonstrated Progress Through Agency Actions Taken in Prior Fiscal Years

NSF has instituted many policies and practices over several years to successfully manage the risks related to the IPA program. Some of the major actions NSF has taken in prior years to address this challenge include:

- Fully addressed recommendations from the OIG report, "NSF Controls to Mitigate IPA Conflicts of Interest," by minimizing risk of conflict of interest when IPA home institutions receiving NSF grants.
- Established the IPA Steering Committee to serve as the primary body for considering policy on NSF's use of IPAs, and to oversee approaches to budgeting and implementation of the IPA program.
- Established a requirement that institutions provide a minimum of 10 percent cost share for every full-time IPA agreement, unless a waiver is granted based on financial hardship. The total amount of

cost share by institutions increased by over $2.1 million due to the implementation of this policy. The cost share mechanism continues to maximize taxpayer value.
- Successfully migrated Program Director and Executive IPAs to the USA Performance system to manage performance consistently throughout the agency.

NSF will continue to maintain the excellent management practices that have been acknowledged by the OIG.

Demonstrated Progress Through Agency Actions Taken in FY 2023

NSF recognizes the need to better vet incoming IPAs via the recent OIG audit on the agency's internal processes. To address concerns and risks identified, NSF established an IPA Candidate Vetting Working Group. The group has made recommendations to the NSF Chief Operating Officer regarding the NSF approach to vetting candidates for IPA positions at NSF.

- The IPA Candidate Vetting Working Group partnered with NSF stakeholders to address issues such as (1) potential threats to national or economic security by IPA candidates with foreign affiliations or sources of funding; (2) potential risks due to other conflicts of interest and commitments; (3) confirmation of eligibility, salary, and employment history; (4) timeliness of vetting relative to employment offers and start of assignment; and (5) responsibility and overall timeline for various aspects of vetting and assessment.
- NSF's Office of Information and Resource Management proactively streamlined the IPA cost formula process for uniformity and implemented a mandatory submission of supporting financial documentation from home institutions when certifying IPA costs in FY 2023.

NSF's Planned and Ongoing Actions

NSF management developed the following anticipated milestones and responses to the findings in the FY 2023 OIG Management Challenge Report in consideration of NSF's strategic and operational objectives, the risks inherent to achieving these objectives, and key actions NSF has already taken.

- The IPA Steering Committee will continue to use enterprise risk management concepts, applying them to the committee's risk environment to monitor metrics related to participation, demographic characteristics, annual costs, and cost share value. The IR/D Council will continue to develop and monitor internal controls related to the IR/D Program, to include clear communication on participation and NSF policies on the use of IR/D.
- The NSF Office of the Director will continue to partner with NSF stakeholders to address (1) potential threats to national or economic security by IPA candidates with foreign affiliations or sources of funding, (2) potential risks due to other conflicts of interest and commitment, and (3) timeliness of vetting relative to employment offers and start of assignment, to include identifying the responsibilities and authorities of different organizations within NSF and how and when they interact during the process.

Additionally, NSF released a Corrective Action Plan (CAP) related to OIG's audit on the agency's IPA vetting process in FY 2023 which consisted of five recommendations. All five recommendations were resolved by March 2023. As agreed, NSF provided updated implementation milestones by October 2, 2023 (FY 2024). Recommendations 2, 4 and 5 of the CAP have been closed. Recommendations 1 and 3 will have new milestone implementation dates in FY 2024 with collaborative efforts across the Office of the Chief of Research Security Strategy and Policy, the Office of General Counsel, and Office of Information and Resource Management.

Summary of OIG's Management Challenge 5: Overseeing NSF-Funded Research Infrastructure

- Major facilities and mid-scale research infrastructure projects are inherently risky because of their uniqueness, complexity, and high costs.
- With a decade of corrective actions implemented, NSF's research infrastructure program is a model program.
- NSF is applying some of its major facility controls to its mid-scale research infrastructure projects.

NSF Management's Overview and Action Plan

NSF Leads: Linnea Avallone, Chief Officer for Research Facilities; Janis Coughlin-Piester, Office Head and CFO, Office of Budget, Finance, and Award Management

NSF funds award recipients to manage the development, design, construction, operation, and disposition of research infrastructure (RI), which are state-of-the art facilities that support research and education and include telescopes, ships, detectors, and distributed observatories. The RI portfolio is complex and has certain inherent risks including meeting emergent scientific objectives, protecting the safety of life and property, potential implementation delays, and unanticipated additional costs. The OIG previously reported on the risk of inadvertent misuse of federal funds and improper use of budget contingency, but the COVID-19 pandemic presented additional, unique challenges across the portfolio. Following the flexibilities granted by the OMB in response to the pandemic, NSF took action to address the associated cost impacts by developing internal and external guidance for RI programs and award recipients. NSF continues to implement mitigation strategies for this unforeseen event and assess any remaining financial impacts as research infrastructure projects and programs return to normal operations.

NSF leadership continues to show its commitment to RI oversight through appointment of the Chief Officer for Research Facilities (CORF), a deputy CORF (with responsibility for strategic oversight of mid-scale RI investments), and periodic use of the Office of the Director's Watch List. The governance structure currently in place, which includes Directorate and Office Representatives (on the Major and Mid-scale Facilities Working Group), Facilities Governance Board, Facilities Readiness Panel, and the Director's Review Board, continues to help ensure consistent implementation of NSF's enhanced controls related to RI oversight. Furthermore, NSF is ensuring adequate human capacity among the RI oversight staff through implementation of the Program Management Improvement Accountability Act (PMIAA) on the RI acquisition portfolio, and by establishing guidance on the necessary core competencies for recipient staff managing RIs.

NSF believes it has demonstrated senior-level leadership commitment through the appointment of the CORF and deputy CORF, has corrective action plans in place that implement solutions that are tied to root causes, and has established appropriate performance measures to monitor construction progress, in response to criteria for removal of this challenge from OIG's list of Management Challenges, as described in OIG Bulletin 18-02, Attachment 2.[7] Capacity is demonstrated through rigorous reporting and accountability, and workforce capacity will continue to be enhanced as NSF completes implementation of PMIAA for the RI portfolio. In addition, NSF has implemented planned corrective actions, demonstrated progress, and monitored on-going activities as described below. Finally, NSF continues to routinely evaluate this management challenge under the agency's Enterprise Risk Management program which considers the activities completed and those planned when assessing remaining risks related to potential waste and poor Awardee performance.

[7] OIG Bulletin 18-02, "Management Challenges," dated August 15, 2018, describes OIG's process for identifying and reporting the most significant management challenges facing NSF and the National Science Board (NSB). This document also describes OIG's criteria for removing prior reported management challenges.

NSF's Completed Actions to Address the Challenge

Since 2015, NSF has implemented enhanced controls and strengthened agency governance to fully address OIG recommendations and those of other external organizations. As a result, oversight of NSF's RI portfolio has continued to evolve and improve each year, making it a model within NSF.

Demonstrated Progress Through Agency Actions Taken in FY 2023

- Continued to use the Office of the Director's Watch List under cognizance of the CORF with inclusion based on credible threats of cost or schedule overruns, performance issues, or constituting a new, high-risk, large-scale endeavor for the agency.
- Revised and published 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.
- Authorized additional management reserve for projects in the Construction Stage to account for the impacts of the COVID-19 pandemic and other unforeseen events and enhanced federal requirements for data security.
- Developed standard award terms and conditions for Mid-scale RI projects, finalized BFA's *Mid-scale RI Pre-award Review Guidance* SOG and completed three Mid-scale RI webinars for the research community to improve proficiencies in Project Execution Plan development.
- Evaluated NSF's use of the Federally Funded Research and Development Center (FFRDC) designation.

NSF's Planned and Ongoing Actions

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

- Continue to enhance the PMIAA Course Curriculum Tool for the RI oversight workforce as part of PMIAA implementation and the corrective action plan related to GAO-19-227[8]. Monitor progress of professional development, for staff overseeing either Major Facilities or Mid-scale RI, through periodic self-assessments.
- Continue to work across NSF Directorates and Offices to "right-size" Mid-scale RI oversight to ensure appropriate implementation of requirements and stewardship of federal funds.
- Implement corrective actions related to the OIG audit of divestment of major facilities.

[8] GAO-19-227 "Cost and Schedule Performance of Large Facilities Construction Projects and Opportunities to Improve Project Management" is available at https://www.gao.gov/products/gao-19-227.

Summary of OIG Management Challenge 6: Mitigating Threats to Research Security

- Federal agencies and academia have made progress in combating undue foreign influence on the U.S. research enterprise.
- NSF has worked to mitigate these threats by creating an Office of the Chief of Research Security Strategy and Policy, developing guidelines for strengthening research security, and continuing to expand research security training for the research community.

NSF Management's Overview and Action Plan

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

To maintain a vibrant science and engineering community for the benefit of the Nation and maintain the integrity of international scientific collaborations, NSF seeks to safeguard the U.S. research enterprise from threats of inappropriate foreign influence. Participation in this community relies on individuals to uphold core principles such as openness, transparency, reciprocity, 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 misappropriate U.S.-funded scientific research prior to its open publication.

NSF focuses on risks to its funded research from foreign government interference related to: (1) required disclosure of biographical data and professional affiliations to U.S. employers of the research community and NSF; (2) undisclosed research duplication and researcher commitments to research entities outside their U.S.-funded scientific research; (3) compromises to the merit review system; and (4) unauthorized use of pre-publication data and information.

Over the past five years, NSF has taken action by strengthening disclosure requirements, collaborating with the research community to develop research security training modules, conducting domestic and international outreach, and publishing a solicitation to establish the SECURE Center.[9] NSF also works closely with the rest of the U.S. government to develop policy that enhances the security and integrity of the science and technology research enterprise.

NSF's Completed Actions to Address the Challenge

In prior fiscal years, NSF completed various actions to safeguard the integrity of federally funded research, including revising disclosure requirements to align with National Security Presidential Memorandum 33 Implementation Guidance,[10] regularly revising the Proposal & Award Policies & Procedures Guide,[11] and engaging with the U.S.-funded research community to identify research security-related training needs.

Demonstrated Progress Through Agency Actions Taken in FY 2023

- Co-chaired the National Science and Technology Council Subcommittee on Research Security, working closely with the White House, other federal science agencies, and the intelligence and law enforcement community to create, publish, and implement common disclosure formats and draft standardized research security program standards.
- In partnership with the National Institutes of Health, the Department of Energy, and the Department of Defense, NSF funded four awards to develop online research security training modules that will

[9] The SECURE Center stands for Safeguarding the Entire Community in the U.S. Research Ecosystem and will provide research security-related support to the U.S.-funded research community.
[10] Guidance for Implementing National Security Presidential Memorandum 33 may be accessed at https://www.whitehouse.gov/wp-content/uploads/2022/01/010422-NSPM-33-Implementation-Guidance.pdf
[11] NSF's Proposal & Award Policies & Procedures Guide may be accessed at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf23001&org=NSF

be made publicly available and cover the importance of research security and best practices; the importance of disclosure and disclosure policies; actions federally funded research recipients can take to manage and mitigate risk; and principled international collaboration.[12]

- Developed and published Program Solicitation (NSF 23-613)[13] on the SECURE Center, referred to as the Research Security and Integrity Information Sharing Analysis Organization (RSI-ISAO), under the CHIPS and Science Act.
- Developed internal guidance and public-facing guidelines[14] on research security data-related practices to clearly define how NSF is assessing research security-related risks.
- Initiated a pilot for the forthcoming malign foreign talent program prohibition under Section 10632 of the CHIPS and Science Act for peer reviewers in the NSF Engines program.
- Solicited a report from the JASON to inform the development of a "Research on Research Security" program, and published a Dear Colleague Letter requesting input from the research community on topics to cover in a workshop that will inform development of this program.[15]
- Scaled data analytics capabilities to identify potential foreign interference and determine the extent of interactions between NSF-funded researchers and researchers located abroad.
- Created a process to support the vetting of incoming Intergovernmental Personnel Act assignments at NSF to mitigate research security-related risks.
- Began concept development and published data elements for the foreign financial support requirement under Section 10339B of the CHIPS and Science Act. Began development of a system to collect this information.

NSF's Planned and Ongoing Actions

- Continue to work with Federal partners to meet CHIPS and Science Act requirements, including identifying a certification process for research security programs and developing an implementation strategy that prohibits involvement in malign foreign talent programs for covered individuals.
- Deliver the completed research security training modules to the research community and implement monitoring and evaluation of the modules.
- Host a research community-wide workshop to support the development of the "Research on Research Security" program.
- Conduct merit review process and review proposals from potential awardees to establish the SECURE Center, as required under Section 10338 of the CHIPS and Science Act.
- Continue to refine and scale-up research security-related analytics capabilities, including the expansion of a pilot sharing research security-related information with the research community.
- Develop a process through the Proposal & Award Policies & Procedures Guide to review the foreign financial disclosure reporting filings submitted to NSF by NSF awardees in the research community, as required under Section 10339B of the CHIPS and Science Act.

[12] The press release for the research security training modules may be accessed at https://new.nsf.gov/news/nsf-2022-research-security-training-united-states

[13] NSF Program Solicitation (NSF 23-613), Research Security and Integrity Information Sharing Analysis Organization (RSI-ISAO), https://www.nsf.gov/pubs/2023/nsf23613/nsf23613.htm

[14] NSF Guidelines for Research Security Analytics may be accessed at https://new.nsf.gov/research-security/guidelines

[15] The Dear Colleague Letter may be accessed at https://www.nsf.gov/pubs/2023/nsf23126/nsf23126.jsp

Management Challenge 7: Mitigating Threats Posed by the Risk of Cyberattacks

- The security of IT systems and data is vital to national security.
- NSF continues to make progress on improving IT security and implementing a zero-trust architecture, but new cybersecurity risks remain.
- Growing use of personal devices that connect to the NSF network may increase security risks.

NSF Management's Overview and Action Plan

NSF Lead: Dorothy Aronson, Chief Information Officer

NSF recognizes the cybersecurity challenges of a digital federal government. Federal agencies are transforming the way information technology and mission critical data is managed. NSF's cybersecurity risk strategy is adaptive, incorporates best practices and provides resilience to emerging cybersecurity threats.

NSF continues to implement a Zero Trust Architecture (ZTA) focusing on priority tasks to address the five pillars of the Zero Trust Maturity Model. NSF maintains strong access controls and a robust capability to quickly detect and respond to incidents, including state-of-the-art network and security protections. Advanced threat and breach protections provide industry-leading threat visibility and detection against attacks.

NSF has made progress in the implementation of enterprise identity management and multifactor authentication (MFA). NSF is employing a multi-pronged approach to MFA for employee and contractor access to agency systems and has continued prioritization of PIV card issuance and use. NSF is focused on ensuring all eligible staff members have a PIV card issued and use PIV to log in to agency systems, as well as providing an alternative phishing-resistant MFA approach where PIV is not viable. NSF is evaluating high-level plans to move internally accessible FISMA Moderate systems to be phishing resistant MFA only. To support this effort, NSF is piloting a strong phishing resistant authorization to establish the groundwork for other internet-accessible applications that require authentication.

NSF is evaluating improvements to its remote access capabilities (e.g., Virtual Private Network (VPN) and Virtual Desktop Infrastructure (VDI)) to improve security and access controls. In addition to rolling out a phishing-resistant MFA solution as an alternative to PIV, NSF is evaluating secure access service edge (SASE) solutions to maximize security across users, devices and applications. Enhancements to remote access methods will improve the confidentiality, integrity, and availability of NSF data.

As NSF moves to a zero-trust architecture the paradigm shift relies in part on the ubiquitous use of strong encryption. The threat posed by the prospect of a cryptanalytically relevant quantum computer (CRQC) requires that NSF prepare to implement post-quantum cryptography (PQC) to prevent exposure of sensitive data. NSF plans to monitor the Federal government's strategy and transitional guidance as PQC standards are finalized. NSF will implement post-quantum cryptography guidance when it is issued.

NSF continues to mature and implement its security information and event management (SIEM). NSF has comprehensive logging and information-sharing capabilities and is expanding log elements and retention periods to further enhance event correlation and incident management.

NSF recertifies user and service accounts including accounts related to its Merit Review system. NSF confirms the completeness of the data used in the annual recertification process for database service accounts to include new sources and completeness in the datasets.

NSF's Completed Actions to Address the Challenge

- NSF enhanced onboarded threat feed information into the SIEM. This allows NSF to enhance vulnerability information and provide additional context to current logging capabilities. NSF plans to ingest other threat feeds into the SIEM moving forward.
- NSF updated its password policy to align with ZTA to remove the requirement for special characters and regular password rotation from internal facing and customer facing systems for accounts assigned to individuals and then implemented the policy.
- NSF made significant strides in moving IT systems and services to the cloud to modernize legacy technology, improve capacity and uptime, enable standardization of services, and leverage the security benefits of cloud-based infrastructure. Over 80 percent of NSF business applications and services are in the cloud. NSF continues to use the principles of zero trust architecture in cloud planning efforts to strengthen data protection, access controls, and application boundaries.
- NSF automated the annual recertification process for its Active Directory service accounts to help mitigate the risk that unnecessary service accounts remain within IT environments.
- NSF completed an inventory of high value assets and systems critical to its mission that use cryptographic algorithms. NSF will transition to post-quantum cryptography for standardization, implementation, and testing of replacement products where vulnerable cryptographic algorithms are identified.

NSF's Planned and Ongoing Actions

NSF's cybersecurity efforts are focused on establishing new capabilities to reduce risk and protect sensitive agency data from compromise. NSF management identified the following priority initiatives in support of federal cybersecurity requirements to mitigate threat posed by the risk of cyberattacks:

- NSF is updating its password enforcement to align with ZTA to implement enterprise tools to check passwords against known-breached data and dictionary words. For customer facing systems, NSF will continue work with Login.gov to determine whether phishing-resistant authentication was used.
- To protect NSF sensitive data on removable storage devices, NSF will use an endpoint management platform to only allow authorized removeable media to be used on NSF managed devices. NSF will update the rules of behavior to inform staff to use only authorized NSF storage devices. USAP has implemented a removable media solution and is actively blocking all removable media and only allows authorized removable media after security review and confirmation of USAP mission need.
- USAP has taken steps to prioritize the PIV implementation for USAP users and deploy necessary resources to fully implement PIV authentication for privileged or administrator level access to the USAP network and for the distribution of PIV cards to privileged employees. USAP has developed a plan through its PIV and MFA Project Plan to distribute PIV and MFA smart cards to unprivileged/ non-sensitive positions in FY 2024.
- USAP continues to implement procedures and a formal monitoring program to screen USAP's fulltime and seasonal staff before access is granted to the USAP network. NSF established additional support to continue prioritizing and screening privileged and non-privileged/non-sensitive positions in FY 2024. USAP has implemented an incident response monitoring and alerting tool through the Department of Justice's Cybersecurity Shared Services Program (CSSP). USAP is completing assessments to identify gaps associated with completing the event logging maturity requirements and ensure the USAP achieves the required maturity levels.

Summary of OIG Management Challenge 8: Addressing Harassment in the Academic Community

- Recent reports[16] and legislation[17] indicate harassment is pervasive in institutions of higher education and a deterrent to participation in STEM.
- NSF has taken actions to address harassment, including implementing an award term and condition that requires institutions to report findings of harassment or assault by NSF-funded principal investigators or co-principal investigators; developing a Polar Code of Conduct; and reaffirmed expectations that research organizations establish and maintain clear and unambiguous standards of behavior.
- NSF also commissioned a needs assessment to better understand the state of sexual harassment in the United States Antarctic Program (USAP). The resulting report highlighted concerns about oversight of sexual harassment response activities by USAP partners, lack of trust in the reporting process, and the need for additional reporting mechanisms.
- It is imperative that NSF continue working to address harassment in the academic community and undertake prevention and response efforts.

NSF Management's Overview and Action Plan

NSF Leads: Linnea Avallone, Chief Officer for Research Facilities; Rhonda Davis, Head, Office of Equity and Civil Rights

The U.S. National Science Foundation is committed to combatting harassment and sexual assault anywhere science or education is conducted, including research stations, vessels, field sites, and NSF-funded programs.

NSF has taken, and continues to take, steps to help ensure all NSF-funded research and learning environments are free from sexual harassment and other forms of harassment. Additionally, NSF continually bolsters our policies, guidelines and communications so that organizations clearly understand expectations and individuals understand their rights. The agency's approach to combatting harassment and sexual assault is guided by the following:

- First, NSF recognizes that to enable scientists, engineers, and students to work at the outermost frontiers of knowledge, the agency must be a role model for teamwork, fairness, and equity.
- Second, investing in science, technology, engineering, and education for the Nation's future necessitates a safe environment, free of any form of harassment, that fosters equal opportunities.
- And finally, NSF is committed to creating safe and inclusive research environments for all.

NSF's Completed Actions to Address the Challenge

Prior to FY 2023, NSF implemented an award term and condition that requires award recipients to notify NSF of any findings or determinations of sexual harassment, other forms of harassment, or sexual assault by an NSF-funded principal investigator or co-principal investigator. Additionally, NSF issued statements to the academic community and states within its Proposal & Awards Policies & Procedures Guide (PAPPG) that

[16] 2018 National Academies of Sciences, Engineering, and Medicine (NASEM) study: Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine on the prevalence and impact of sexual harassment in science, engineering, and medical departments and programs. The report is available at https://www.nationalacademies.org/our-work/sexual-harassment-in-academia

[17] The recently enacted CHIPS and Science Act requires NSF to undertake a follow-on study to examine the influence of sexual harassment in institutions of higher education on the career advancement of individuals in the STEM workforce and assess progress in implementing recommendations from the 2018 report. Efforts to do so are already underway.

NSF expects all research organizations to establish and maintain clear and unambiguous standards of behavior to ensure harassment-free workplaces.

Demonstrated Progress Through Agency Actions Taken in FY 2023

During FY2023, NSF took the following actions to address harassment:

- NSF Grant and Cooperative Agreement Term and Condition Monitoring, Updating and Education: NSF continued to receive, review, and monitor notifications filed under the harassment notification term and condition, as well as conducted standard Title IX compliance reviews of NSF awardee organizations.[18] In addition, NSF gathered input to support modifications to the awardee complaint portal for sexual and gender-based harassment complaints, and commissioned an independent evaluation of the harassment notification term and condition and conference requirement.
- Policy and Procedure Guidance: NSF revised the PAPPG[19] to require that proposals with off-campus or off-site work include a certification that proposers have a plan for creating and maintaining Safe and Inclusive Working Environments for Off-Campus and Off-Site Research for that project. NSF also reiterated the responsibility of all NSF employees to swiftly report sexual harassment by issuing OECR Bulletin No. 23-02: Sexual Harassment Reporting.[20]
- Supporting Safer Research Environments: NSF established a new Sexual Assault and Harassment Prevention and Response (SAHPR) Office to serve as NSF's centralized communication point for sexual assault and sexual harassment matters, ensuring matters are appropriately referred and providing access to resources and guidance to help prevent and address sexual assault and harassment. NSF developed and implemented an 8-point action plan[21] to ensure a safe and productive environment for scientists, support personnel, and visitors who participate in USAP activities. Key completed actions include:
    - Established the Director's SAHPR Task Force to facilitate cross-agency coordination on the action plan for USAP.
    - Established the saferscience@nsf.gov contact line as the single point of contact for all comments, inquiries or reports for the community.
    - Established formal lines of communication with federal partners to coordinate response and follow-up on sexual assault and harassment issues. Began the process of building an accountability framework among the partners.
- NSF released a Dear Colleague Letter, which explicitly encourages applicants to submit research proposals that address:
    - Anti-Harassment in STEM education and research settings and workplaces, and,
    - Culture change and organizational policy structure projects to create harassment-free STEM education and research settings and workplaces.

Please see the discussion of Management Challenge 2: Managing the US Antarctic Program (USAP) for more details on the implementation of this plan.

[18] Includes academic institutions or other organizations with NSF grants, cooperative agreements or contracts.
[19] The PPAPG section on Safe and Inclusive Working Environments is available at https://new.nsf.gov/policies/pappg/23-1/ch-2-proposal-preparation#2E9
[20] OECR Bulletin No. 23-02 is available at https://www.nsf.gov/od/oecr/docs/oecr2302.pdf
[21] Available at https://www.nsf.gov/od/oecr/docs/nsf-actions-to-prevent-sexual-assault-and-harassment.pdf

NSF's Planned and Ongoing Actions

Moving into FY 2024, NSF remains committed to continuing the work to combat sexual misconduct and to ensure all NSF environments are safe, harassment and assault-free spaces with a positive and inclusive culture. Some of NSF's planned and ongoing actions include:

- Conduct an independent evaluation to examine community understanding, experiences with, and implementation of NSF's harassment notification term and condition and conference requirement.
- Conduct pilots to test and evaluate an off-campus and off-site research proposal requirement that extends beyond self-certification and requires that grant applicants submit a plan for creating and maintaining a safe and inclusive working environment as a part of the merit review process.
- Evaluate how NSF award terms and conditions could be modified to further promote safe and inclusive research environments.
- Conduct outreach and benchmarking with federal partners and international entities on promising policies, practices, and procedures for creating and maintaining safe and inclusive environments.
- Develop a secure system to document activity and data on sexual assault and harassment reports.

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. NSF does not have any high-priority programs as defined by A-123 Appendix C (programs with estimates of improper payments resulting in monetary loss that exceeds $100 million annually). More detailed information on NSF's payment integrity program can be found at https://paymentaccuracy.gov/.

Actions Taken to Address Auditor Recovery Recommendations

Using OMB Circular A-123, Appendix C, Part V.B.2 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 does not conduct payment recapture audits.

NSF has leveraged the results of the work performed under PIIA, audits, grant monitoring programs, and internal control reviews. All activities 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.

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 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 2022 inflation adjustments to civil monetary penalties.

Table 3.3 – FY 2023 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	2023	$34,457	87 FR 79910 Wednesday, December 28, 2022
Antarctic Conservation Act of 1978, 16 U.S.C., 2401 *et seq.,* as amended	Antarctic Conservation Act, Not knowing violations	1978	2023	$20,362	87 FR 79910 Wednesday, December 28, 2022
Program Fraud Civil Remedies Act of 1986, 31 U.S.C., 3801, *et seq.*	Program Fraud violations	1986	2023	$13,508	87 FR 79910 Wednesday, December 28, 2022

GRANTS PROGRAM REPORTING

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, 2023.

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	331	236	101
Number of Grants/ Cooperative Agreements With Undisbursed Balances	0	0	0
Total Amount of Undisbursed Balances	$0	$0	$0

Information shown above is as of 9/30/2023.

As indicated in the table above, NSF's 668 financial assistance awards (grants, cooperative agreements, and fellowships) that are expired but not closed have zero-dollar balances in NSF's financial accounting system. The majority of these awards (98 percent) that are still not fully closed have overdue final project reports and/or project outcome reports and cannot be completely closed. In FY 2022, NSF reported 683 awards still open and no awards with undisbursed funds. NSF reviews operating policies and accounting practices to close all awards on the same schedule, thereby, ensuring the number is zero.

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. NSF administratively closes awards nightly and runs the automated closeout routines daily to close out awards as quickly as possible.

NSF has made progress in decreasing the number of overdue final project reports and/or project outcome reports by implementing policies and procedures to track and enforce the submission of required project reports. NSF reviews overdue report information for awards that may be eligible for reporting in the Federal Awardee Performance and Integrity Information System (FAPIIS), as prescribed in the revised 2 CFR § 200 published in the Federal Register on August 13, 2020.[1] NSF has not yet reported any awards/ Awardees. A working group is addressing internal policy and procedures related to FAPIIS. Further, in FY 2023, NSF introduced a pilot program wherein an awardee organization's ability to draw down expenses may be suspended for awards with overdue project reports. NSF expects report compliance to increase for organizations in the pilot.

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

UNDISBURSED BALANCES IN EXPIRED GRANT ACCOUNTS

In FY 2023, NSF funded research and education in science and engineering through grants, cooperative agreements, and other financial assistance award instruments to 1,850 colleges, universities, and other institutions. For all NSF financial assistance award instruments, awardees must include all costs during the period of performance of the award. Per NSF policy in the Proposal and Award Policies and Procedures Guide (PAPPG), awardees typically have 120 days after the grant expires to complete final drawdowns and expenditures.

The information provided here pertains to the agency's two main grant making appropriation accounts: Research and Related Activities and STEM Education. 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 expired periods of performance.
- **Undisbursed balances on expired grants** refers to amounts that remain available for expenditures before financial closeout.
- **Undisbursed balances for expired grant awards that may be returned to the Treasury** refers to funding that was previously obligated on a grant award and was subsequently de-obligated, and never re-obligated prior to the cancellation of the source appropriation.
- **Amounts that have not been obligated to a specific grant or project** refers to unobligated amounts for grant related funding in expired appropriation accounts.

NSF has developed leading practices for monitoring and de-obligating balances on expired grant awards through automated processes. Once a grant has expired, NSF executes actions to close out the grant both administratively and financially. The financial closeout action occurs 120 days after the award expiration date, and de-obligates the remaining undisbursed balances from the award. Administrative closeout is initiated after financial closeout is completed. 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 Circular A-136, Section II.4.9.2 *Reporting Related to Commerce, Justice, Science, and Related Agencies Appropriation Act*.

1. **Information about future action NSF will take to resolve undisbursed balances for grant awards for which the period of performance has expired**
   NSF continually monitors its grant awards throughout their lifecycle following a comprehensive post-award monitoring process. NSF utilizes automated, system-based processes to close grants based on their period of performance end date. This process de-obligates all undisbursed award balances 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 awardees fully spend the funds obligated throughout the course of their research.

2. **The method that NSF uses to track undisbursed balances in expired grant awards**
   NSF completes timely financial closeout of expired grant awards daily through an automated process. Eligibility for NSF grant award closeout begins 120 days after the award expiration date. The NSF closeout process automatically de-obligates any undisbursed award balance, generates an award closeout transaction to flag the award as financially closed, and records the financial closeout date to NSF's award management system to initiate final administrative closeout procedures.

Awardees and NSF personnel can view the expected award closeout date through the Award Cash Management Service (ACM$). ACM$ requires awardees to submit payment amounts and expenditures at the individual award level each time funds are requested by awardees, allowing NSF to conduct post-award monitoring activities on individual awards.

3. **The identification of undisbursed balances for expired grant awards that may be returned to the Department of Treasury (Treasury)**
   When NSF closes out a grant award, it de-obligates the undisbursed balances. The de-obligated grant balances are treated one of three ways:
   - If the source appropriation is unexpired, 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 is canceling in the current fiscal year, NSF de-obligates all undisbursed grant balances prior to September 30 as part of its year-end close process, and subsequently returns the funding to Treasury.

   For FY 2023, the amount of undisbursed funding previously obligated on grant awards that NSF returned to Treasury was $81.5 million.

4. **The number of expired grant awards, the undisbursed balances on these expired grants, and the amounts that have not been obligated to a specific grant or project remaining in the appropriations accounts as of September 30, 2023; September 30, 2022; and September 30, 2021.**
   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 on September 30 before NSF executes its regular closeout processes described above. For FY 2023, there were 4,988 expired grants with undisbursed balances of $129,860,154. Table 3.5 also presents amounts that have not been obligated to a specific grant or project as of September 30.

Table 3.5 – Status of Undisbursed Balances in Expired Grants

	FY 2023 (as of 9/30/2023)	FY 2022 (as of 9/30/2022)	FY 2021 (as of 9/30/2021)
Number of expired grants with undisbursed balances	4,988	5,127	4,616
Undisbursed balances prior to closeout	$129,860,154	$123,876,877	$99,486,778
Amounts that have not been obligated to a grant or project remaining in the appropriations accounts[1]	$257,151,673	$226,104,413	$209,615,739

[1] NSF updated this table for FY 2023 to align with updates to OMB Circular A-136, Section II.4.9.2 *Reporting Related to Commerce, Justice, Science, and Related Agencies Appropriation Act*. This figure includes data from NSF's Research and Related Activities and STEM Education appropriation accounts.

AWARDS TO AFFILIATED INSTITUTIONS

The following table lists institutions affiliated with members of the National Science Board (NSB) in FY 2023.[1]

Affiliated Institution	Awards Obligated in FY 2023 (Dollars in thousands)
Arizona State University	$112,252
Auburn University	22,449
Catholic University of America	2,591
Iowa State University	47,828
Ohio State University	83,292
Southwest Research Institute	1,141
University of California, Los Angeles	55,516
University of Illinois	167,666
University of Massachusetts	67,820
University of Michigan	135,405
University of Tennessee	27,549
University of Texas, El Paso	18,857
University of the District of Columbia	1,734
University of Utah	47,946
University of Vermont	13,736
Vanderbilt University	29,888
Virginia Tech University	60,875
Washington University	31,594
TOTAL	**$928,139**

[1] 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, 2023. 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 prohibits 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://www.nsf.gov/pubs/2023/nsf23002/pdf/nsf23002.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, 2023 and 2022. AD IPAs led four directorates during the fiscal year ended September 30, 2023 and four directorates during the fiscal year ended September 30, 2022. 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 2023 Awards to AD IPAs' Home Institutions

(Dollars in Thousands)

Directorate	Total Dollars and Awards Made by Directorate in FY 2023	Home Institution of IPA Assistant Director	Total Dollars and Awards to Home Institution by Directorate in FY 2023	Total Dollars and Awards to Home Institution by NSF in FY 2023
Biological Sciences	$852,468 (1,868 awards)	University of California	$7,063 (17 awards)	$74,676 (166 awards)
Computer & Information Science & Engineering	$1,070,614 (3,352 awards)	Princeton University	$12,333 (38 awards)	$66,293 (154 awards)
Engineering	$777,047 (2,629 awards)	Emory University	$1,189 (4 awards)	$27,057 (47 awards)
STEM Education	$1,362,115 (2,164 awards)	Ohio State University	$6,734 (9 awards)	$83,503 (161 awards)
Total	$4,062,244 (10,013 awards)		$27,319 (68 awards)	$251,529 (528 awards)

Table 3.7 – FY 2022 Awards to AD IPAs' Home Institutions

(Dollars in Thousands)

Directorate	Total Dollars and Awards Made by Directorate in FY 2022	Home Institution of IPA Assistant Director	Total Dollars and Awards to Home Institution by Directorate in FY 2022	Total Dollars and Awards to Home Institution by NSF in FY 2022
Computer & Information Science & Engineering	$1,039,029 (2,117 awards)	Princeton University	$10,099 (37 awards)	$57,590 (129 awards)
Engineering	$970,237 (3,260 awards)	Emory University	$424 (3 awards)	$8,387 (41 awards)
Social, Behavioral, & Economic Sciences	$253,555 (1,150 awards)	University of Michigan	$55 (2 awards)	$4,101 (23 awards)
Education & Human Resources	$1,432,621 (3,126 awards)	Ohio State University	$2,726 (5 awards)	$13,115 (26 awards)
Total	$3,695,442 (9,653 awards)		$13,304 (47 awards)	$83,193 (219 awards)

NSF SENIOR MANAGEMENT AND NATIONAL SCIENCE BOARD

NSF Senior Management
(as of September 30, 2023)

Office of the Director (O/D)
Sethuraman Panchanathan, *Director*
Vacant, *Deputy Director*
Karen A. Marrongelle, *Chief Operating Officer*
Brian W. Stone, *Chief of Staff*

O/D Offices

Office of Equity and Civil Rights
Rhonda Davis, *Head*
Affirmative Action Officer

Office of the General Counsel
Angel Williams, *General Counsel*

Office of Integrative Activities
Alicia Knoedler, *Head*

Office of International Science & Engineering
Kendra Sharp, *Head*

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

Directorate for Biological Sciences
Susan Marqusee, *Assistant Director*

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

Directorate for STEM Education
James L. Moore III, *Assistant Director*

Directorate for Engineering
Susan Margulies, *Assistant Director*

Directorate for Geosciences
Alexandra R. Isern, *Assistant Director*

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

Directorate for Social, Behavioral, & Economic Sciences
Sylvia Butterfield, *Assistant Director (Acting)*

Directorate for Technology, Innovation and Partnerships
Erwin Gianchandani, *Assistant Director*

Office of Budget, Finance, & Award Management
Janis Coughlin-Piester, *Head*
Chief Financial Officer
Performance Improvement Officer

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

Other Designated Senior Officials

Chief Diversity and Inclusion Officer
Charles Barber (O/D)

Chief Information Officer
Dorothy Aronson (O/D)

Chief Officer for Research Facilities
Linnea Avallone (O/D)

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

National Science Board Members
(during FY 2023)

Terms expire May 10, 2024

Deborah Loewenberg Ball
University of Michigan

Vicki Chandler
Minerva University

Maureen L. Condic
University of Utah

Suresh V. Garimella
University of Vermont

Stephen Leath
Auburn University (retired)

Dan Reed, *NSB Chair*
University of Utah

Alan Stern
Southwest Research Institute

Stephen H. Willard
NRx Pharmaceuticals

Terms expire May 10, 2026

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

Roger N. Beachy
Washington University, St. Louis (retired)

Aaron Dominguez
Catholic University of America

Dario Gil
IBM

Melvyn E. Huff
University of Massachusetts, Dartmouth

Matthew Malkan
University of California, Los Angeles

Scott Stanley
Techno Planet

Heather A. Wilson
University of Texas, El Paso

Terms expire May 10, 2028

Dorota Grejner-Brzezinska
The Ohio State University

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

Julia M. Phillips
Sandia National Laboratories (retired)

Marvi Matos Rodriguez
Boeing Company

Keivan Stassun
Vanderbilt University

Merlin Theodore
Oak Ridge National Laboratory

Wanda E. Ward
University of Illinois Urbana-Champaign

Bevlee Watford
Virginia Polytechnic Institute and State University

Terms expired, but temporarily served as consultants to the Board in FY 2023

Arthur Bienenstock
Stanford University

W. Kent Fuchs
University of Florida

W. Carl Lineberger
University of Colorado

Emilio F. Moran
Michigan State University

Anneila I. Sargent
California Institute of Technology

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 1,783 NSF invention disclosures reported to NSF either directly or through the National Institutes of Health's iEdison database during FY 2023. 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
AOAM	Agency Operations and Award Management
APR	Annual Performance Report
BFA	Office of Budget, Finance and Award Management
CAP	Corrective Action Plan
CFO	Chief Financial Officer
COVID	Coronavirus Disease
DAAP	Data Analytics and Assurance Program
DEIA	diversity, equity, inclusion, and accessibility
ERM	Enterprise Risk Management
EDU	STEM Education
EPSCoR	Established Program to Stimulate Competitive Research
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
FTE	full-time equivalent
FY	fiscal year
GAAP	generally accepted accounting principles
GAO	Government Accountability Office
GPRA	Government Performance and Results Modernization Act of 2010
GRANTED	Growing Research Access for Nationally Transformative Equity and Diversity
GRFP	Graduate Research Fellowship Program
H-1B	H-1B Nonimmigrant Petitioner Account
IAA	Interagency Agreement
IG	Inspector General
IPA	Intergovernmental Personnel Act
IT	Information Technology
iTRAK	NSF's financial management system
MREFC	Major Research Equipment and Facilities Construction
MSI	minority-serving institution
NSB	National Science Board
NSF	National Science Foundation
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
PIV	personal identity verification
PMIA	Program Management Improvement Accountability Act

PP&E	General Property, Plant, and Equipment
R&D	Research and Development
R&RA	Research and Related Activities
SAM	System for Award Management
SBIR	Small Business Innovation Research
SBR	Statement of Budgetary Resources
SFFAS	Statement of Federal Financial Accounting Standards
SSAE	Statement of Standards for Attestation Engagements
STEM	science, technology, engineering, and mathematics
STTR	Small Business Technology Transfer
TIP	Directorate for Technology, Innovation and Partnerships
USAP	U.S. Antarctic Program
USSGL	United States Standard General Ledger
ZTA	Zero-trust Architecture