

Audit of NSF's Mid-scale Research Infrastructure Programs

REPORT PREPARED BY SIKICH CPA LLC





At a Glance

Audit of NSF's Mid-scale Research Infrastructure Programs
OIG 25-02-001 | October 28, 2024

AUDIT OBJECTIVE

The U.S. National Science Foundation Office of Inspector General engaged Sikich CPA LLC (Sikich) to conduct a performance audit of NSF's Mid-scale Research Infrastructure Programs. The auditors evaluated 12 of the 78 Mid-scale Research Infrastructure (RI) awards within NSF's Mid-scale RI portfolio as of August 1, 2023. The audit objective was to determine whether NSF has sufficient policies and procedures in place to enable it to conduct oversight of Mid-scale RI awards and ensure awardees are able to meet program objectives. A full description of the audit's objective, scope, and methodology is attached to the report as Appendix B.

AUDIT RESULTS

NSF did not have sufficient policies and procedures in place to ensure it consistently conducted oversight procedures for Mid-scale RI awards and did not always perform adequate award oversight activities to ensure awardees complied with relevant guidance. Specifically, NSF did not consistently code or track Mid-scale RI awards; always verify Mid-scale RI awards were proposed and awarded in accordance with Mid-scale RI guidance; establish timely proposal, award, monitoring and reporting guidance; and always perform required Mid-scale RI award oversight activities to ensure awardees complied with relevant guidance. However, since the commencement of the audit, NSF noted that it has implemented steps that will potentially improve and clarify the oversight responsibilities applicable to Mid-scale RI awards. Sikich is responsible for the attached report and the conclusions expressed in it. NSF OIG does not express any opinion on the conclusions presented in Sikich's audit report.

RECOMMENDATIONS

The report includes five recommendations to help NSF improve its oversight of Mid-scale RI awards and to reduce the financial and management risks for the Mid-scale RI programs.

AUDITEE RESPONSE

NSF agreed with all five of the report's recommendations. NSF's response is attached, in its entirety, to the report as Appendix A.

CONTACT US

For congressional, media, and general inquiries, email OIGPublicAffairs@nsf.gov.



U.S. NATIONAL SCIENCE FOUNDATION
Office of Inspector General

MEMORANDUM

DATE: October 28, 2024

TO: Janis Coughlin-Piester
Chief Financial Officer and BFA Office Head
Office of Budget, Finance, and Award Management
U.S. National Science Foundation

Linnea Avallone
Chief Officer for Research Facilities
Office of the Director
U.S. National Science Foundation

FROM: Theresa S. Hull [REDACTED]
Assistant Inspector General
Office of Audits, Inspections, and Evaluations

SUBJECT: Final Report No. 25-02-001, *Audit of NSF's Mid-scale Research Infrastructure Programs*

This memorandum transmits the Sikich CPA LLC (Sikich) report for the Audit of NSF's Mid-scale Research Infrastructure Programs. The auditors evaluated 12 of the 78 Mid-scale Research Infrastructure (RI) awards within NSF's Mid-scale RI portfolio as of August 1, 2023. The audit objective was to determine whether NSF has sufficient policies and procedures in place to enable it to conduct oversight of Mid-scale RI awards and ensure awardees are able to meet program objectives. A full description of the audit's objective, scope, and methodology is attached to the report as Appendix B.

In accordance with Office of Management and Budget Circular A-50, please provide a written corrective action plan to address the report recommendations. The plan should detail specific actions and associated milestone dates. Please provide the plan within 60 calendar days.

OIG Oversight of the Audit

Sikich is responsible for the attached auditors' report and the conclusions expressed in this report. We do not express any opinion on the conclusions presented in Sikich's audit report. To fulfill our responsibilities, we:

- reviewed Sikich's approach and planning of the audit;
- evaluated the qualifications and independence of the auditors;
- monitored the progress of the audit at key points;
- coordinated periodic meetings with Sikich, as necessary, to discuss audit progress, findings, and recommendations;
- reviewed the audit report prepared by Sikich; and
- coordinated issuance of the audit report.

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 Billy McCain at 703-292-7100 or OIGPublicAffairs@nsf.gov.

Attachment

CC: Darío Gil, Victor McCrary, Wanda Ward, Scott Stanley, John Veysey, Ann Bushmiller, Micah Cheatham, Judy Hayden, Christina Sarris, Roland Roberts, Jason Bossie, Matthew Hawkins, Patrick Breen, Timothy Kashmer

EXECUTIVE SUMMARY

The Sikich CPA LLC (formerly known as Cotton & Company Assurance and Advisory, LLC) audit team determined that NSF did not have sufficient policies and procedures in place to ensure it consistently conducted oversight procedures for Mid-scale Research Infrastructure (Mid-scale RI) awards and did not always perform adequate award oversight activities to ensure awardees complied with relevant guidance. Specifically, the audit report includes four observations and five recommendations for improving NSF's Mid-scale RI oversight processes.

AUDIT OBJECTIVES

The National Science Foundation Office of Inspector General engaged Sikich CPA LLC (herein referred to as “we”) to conduct a performance audit to determine whether NSF has sufficient policies and procedures in place to enable it to conduct oversight of Mid-scale RI awards and ensure awardees are able to meet program objectives. We have attached a full description of the audit's objectives, scope, and methodology as [Appendix B](#).

AUDIT CRITERIA

The audit team gained an understanding of NSF's Mid-scale RI award management environment and evaluated whether NSF conducted award oversight activities consistent with the policies, procedures, standard operating guides, and other guidance NSF had published as of August 1, 2023, the date the audit began.

The audit team included references to relevant criteria within each observation and defined key terms within the Glossary located in [Appendix D](#).

We conducted this performance audit in accordance with Generally Accepted Government Auditing Standards (GAGAS) issued by the Comptroller General of the United States.

AUDIT OBSERVATIONS

As summarized in [Appendix C](#), we found that NSF did not have sufficient policies or procedures in place to consistently conduct award oversight activities. As a result, we noted that NSF did not:

- Consistently code or track Mid-scale RI awards
- Always verify Mid-scale RI awards were proposed and awarded in accordance with Mid-scale RI guidance
- Establish timely proposal, award, monitoring, and reporting guidance
- Always perform required Mid-scale RI award oversight activities to ensure awardees complied with relevant guidance

RECOMMENDATIONS

The audit report includes five recommendations to help NSF improve its oversight of Mid-scale RI awards and to reduce the financial and management risks for the Mid-scale RI program.

NSF RESPONSE

NSF agreed with all five recommendations in the report, although it disagreed with the applicability of some of the criteria. NSF's response is attached, in its entirety, to the report as [Appendix A](#).

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Abbreviations

AICA	2017 American Innovation and Competitiveness Act
AIR	Antarctic Infrastructure Recapitalization
AST	NSF's Astronomical Sciences Division
BFA	NSF's Office of Budget, Finance and Award Management
CA	Cost Analyst
CAP	NSF's Cost Analysis and Pre-Award Branch
CFR	Code of Federal Regulations
COO	Concept of Operations
CSB	NSF's Cooperative Support Branch
DACS	NSF's Division of Acquisition and Cooperative Support
DGA	NSF's Division of Grants and Agreements
DIAS	NSF's Division of Institution and Award Support
FAPIIS	Federal Awardee Performance and Integrity Information System
FY	Fiscal Year
GAGAS	Generally Accepted Government Auditing Standards
G/AO	Grants and Agreements Officer
ICER	Independent Cost Estimate Review
IPT	Integrated Project Team

LFO	Large Facilities Office
MFG	Major Facilities Guide
MP	Management Plan
MREFC	Major Research Equipment and Facilities Construction
MRI	Major Research Instrumentation
NSF	National Science Foundation
NHERI	National Hazards Engineering Research Infrastructure
NSB	National Science Board
NSF	National Science Foundation
OIG	Office of Inspector General
OMB	Office of Management and Budget
OPEP	Operations Project Execution Plan
PEP	Project Execution Plan
PHY	NSF's Physics Division
PO	Program Officer
RI	Research Infrastructure
RIG	Research Infrastructure Guide
RIO	NSF's Research Infrastructure Office
SAM	System for Award Management
SOG	Standard Operating Guide
STEM	Science, Technology, Engineering, and Math
TPC	Total Project Cost

AUDIT BACKGROUND

The National Science Foundation is an independent federal agency created “to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes” (Pub. L. No. 81-507). NSF funds research and education in science and engineering by awarding grants and contracts to educational and research institutions throughout the United States.

Most federal agencies have an Office of Inspector General that provides independent oversight of the agency’s programs and operations. Part of NSF OIG’s mission is to conduct audits and investigations to prevent and detect fraud, waste, and abuse. In support of this mission, NSF OIG may conduct independent and objective audits, investigations, and other reviews to promote the economy, efficiency, and effectiveness of NSF programs and operations, as well as to safeguard their integrity. NSF OIG may also hire contractors to provide these audit services.

NSF OIG engaged Sikich CPA LLC (formerly known as Cotton & Company Assurance and Advisory, LLC, and herein referred to as “we”) to conduct a performance audit of NSF with the goal of evaluating NSF’s Mid-scale **Research Infrastructure** (Mid-scale RI) program policies, processes, controls, award management environment, and oversight capabilities.

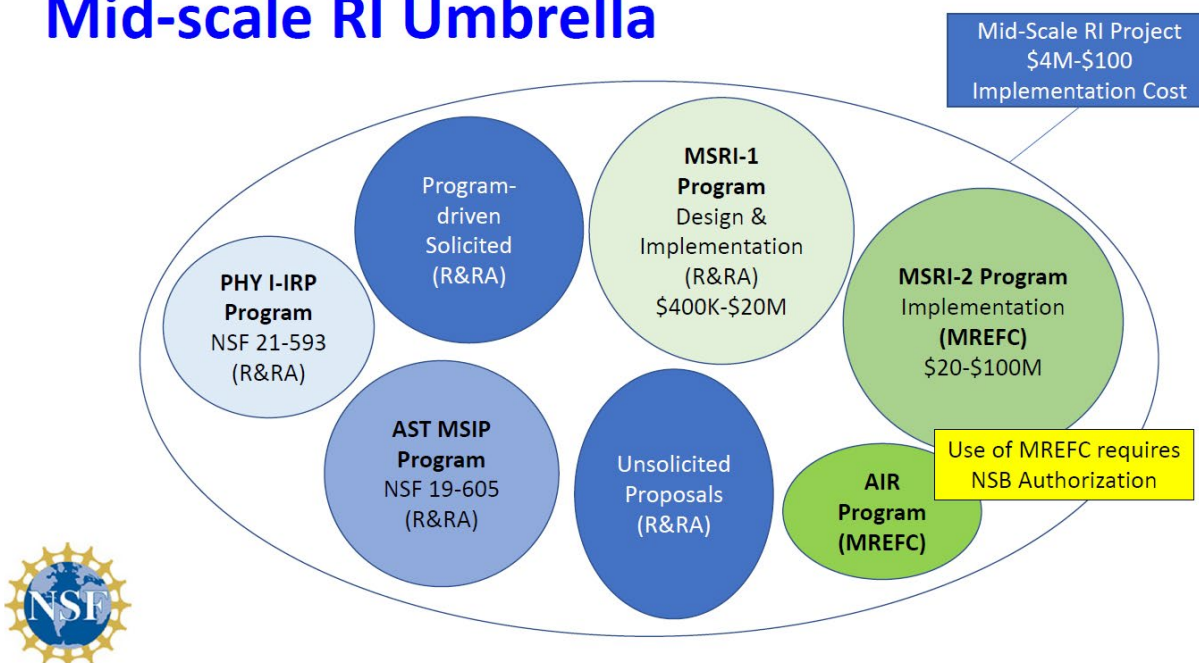
MID-SCALE RESEARCH INFRASTRUCTURE PROGRAM BACKGROUND

Although NSF has funded Mid-scale RI projects for decades, the 2017 American Innovation and Competitiveness Act (AICA) directed NSF to “evaluate the existing and future needs, across all disciplines supported by the Foundation, for mid-scale projects” and to “develop a strategy to address the needs identified.” In response to these directives, NSF developed two new centralized, competitive Mid-scale RI funding programs, **Mid-scale RI-1** and **Mid-scale RI-2**, which were intended to provide NSF with an agile, NSF-wide process for funding certain mid-scale projects.¹ Additionally, NSF continues to fund and track Mid-scale projects funded from other programs with an implementation cost between \$4 million and \$100 million as **Mid-scale RI-Other** awards, as illustrated in Figure 1.

¹ Per Section 109 of AICA, a mid-scale project means research instrumentation, equipment, and upgrades to major research facilities or other research infrastructure investments that exceed the maximum funded by the Major Research Instrumentation program (MRI) but are below that of a multi-user research facility project (Major Facility).

Figure 1: NSF's Mid-scale Umbrella

Mid-scale RI Umbrella



Source: NSF Mid-scale RI Umbrella graphic provided by NSF's Research Infrastructure Office (RIO).²

- Mid-scale RI-1 programs support either the design or implementation of unique and compelling RI projects. Design projects include the design efforts intended to lead to eventual implementation of a Mid-scale class RI project and may be awarded starting at \$400,000. Implementation projects involve the acquisition and/or construction of RI and may have a **Total Project Cost (TPC)**³ in the range of \$4 million⁴ to \$20 million. NSF funds these programs through appropriations in its Research and Related Activities (R&RA) account.
- Mid-scale RI-2 programs support the implementation of unique and compelling RI projects with a TPC in the range of \$20 million to \$100 million. Mid-scale RI-2 projects aim to fill a research community-defined scientific need, or address an identified national research priority, that enables current and next-generation U.S. researchers and a diverse Science, Technology, Engineering, and Math (STEM) workforce to remain competitive in a global research environment. NSF funds these programs through appropriations within its Major Research Equipment and Facilities Construction (MREFC) account, and the programs therefore require

² Within Figure 1, AST refers to NSF's Division of Astronomical Sciences, and PHY I-IRP refers to NSF's Division of Physics Investigator-Initiated Research Projects.

³ Per Section 1.4.4 of NSF's Research Infrastructure Guide (RIG), NSF considers projects with a TPC within the mid-scale project range, as defined by the AICA, within its Mid-scale RI program. If the TPC is within the mid-scale project range as defined by statute, NSF will consider the project a Mid-scale RI project throughout its full life cycle, even if individual awards do not fall within this threshold.

⁴ The original solicitation for this program was \$6 million, which included cost share. NSF has since revised the solicitation to more clearly align with the upper limit of NSF's investment in the MRI program.

National Science Board (NSB) authorization before NSF may award funding for them.

- Mid-scale RI-Other awards include any RI awards not funded from the Mid-scale RI-1 or Mid-scale RI-2 programs. As illustrated in Figure 1 above, these include funding programs managed at the division level (such as the Astronomy [AST] and Physics [PHY] divisions), program-driven solicited awards, projects awarded in response to unsolicited proposals, and NSF's Antarctic Infrastructure Recapitalization (AIR) program awards. NSF funds these programs either through the R&RA account or through the Major Research Equipment and Facilities Construction (MREFC) account as authorized by Congress through NSF's budget request.

NSF'S MID-SCALE RI PORTFOLIO

For the purpose of this audit report, we will collectively refer to the Mid-scale RI-1, Mid-scale RI-2, and Mid-scale RI-Other programs as NSF's Mid-scale portfolio. NSF's [Research Infrastructure Office \(RIO\)](#), formerly known as the Large Facilities Office (LFO), tracks all awards that it considers to be within NSF's Mid-scale RI portfolio in its *Research Infrastructure List*, which it maintains and updates on a quarterly basis. The August 2023 *Research Infrastructure List*⁵ contained 83 Mid-scale RI awards, including 21 Mid-scale RI-1 awards, 8 Mid-scale RI-2 awards, and 54 Mid-scale RI-Other awards. However, based on our review and reconciliation of NSF's Mid-scale awards, we determined that the scope of our audit included 22 Mid-scale RI-1 awards, 8 Mid-scale RI-2 awards, and 48 Mid-scale RI-Other awards. [Appendix B](#) provides detailed information regarding the awards within our audit scope.

OVERSIGHT OF NSF'S MID-SCALE RI

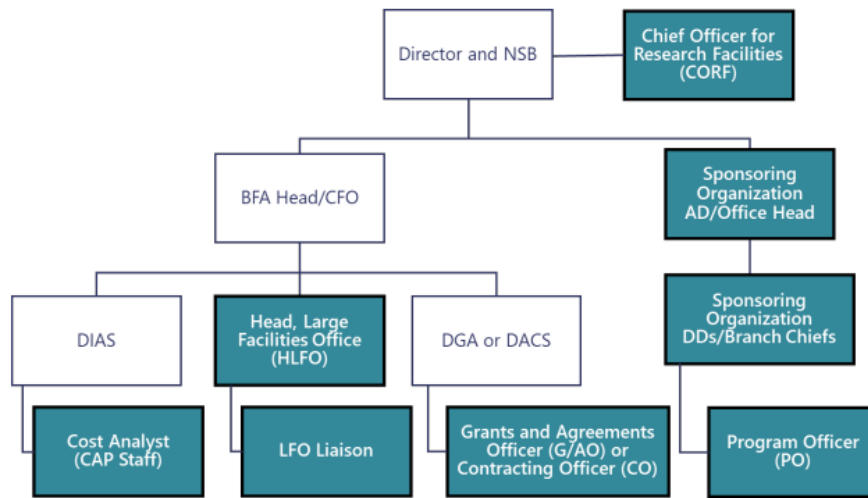
NSF's RIO is responsible for tracking the awards within NSF's Mid-scale RI portfolio, as well as for supporting the oversight of Mid-scale RI awards in close collaboration with NSF program offices and other units within NSF's [Office of Budget, Finance, and Award Management \(BFA\)](#). During our audit period, personnel within NSF's [Division of Acquisition and Cooperative Support \(DACS\)](#)⁶ and [Division of Grants and Agreements \(DGA\)](#), both within BFA, were responsible for administering individual awards within the Mid-scale RI portfolio.⁷ NSF's [Research Infrastructure Guide \(RIG\)](#), which replaced its [Major Facilities Guide \(MFG\)](#) in December 2021, contains NSF's guidance for full life-cycle oversight of major facility and Mid-scale RI projects, including an organizational chart highlighting the staff who have primary oversight and management roles and responsibilities for awards within the Mid-scale RI portfolio, as illustrated in Figure 2.

⁵ The *Research Infrastructure List* that RIO provided for the purpose of this audit was last updated in August 2023 and was titled "Research Infrastructure List_MidScaleRI-Update_Aug2023."

⁶ DACS includes two branches that administer Mid-scale RI awards: the Contracts Branch (CB) and the [Cooperative Support Branch \(CSB\)](#). CSB has been renamed the Infrastructure Support Branch (ISB).

⁷ During our audit interviews, NSF indicated that DACS will administer all future Mid-scale RI awards through either the CB or ISB, depending on the award instrument used.

Figure 2: NSF Organization Chart of Staff with Primary Oversight and Management Responsibilities for Major Facility and Mid-Scale RI Projects



Source: Figure 2.1.6-1 in NSF's RIG (NSF 21-107), published December 10, 2021.

The RIG notes that the **Program Officer (PO)** identified in Figure 2 has the primary responsibility for overseeing the technical performance aspects of a Mid-scale RI award and chairs the **Integrated Project Team (IPT)**. The RIG also includes the following descriptions for other personnel with primary oversight and management roles and responsibilities for Mid-scale RI awards:

- The **Grants and Agreements Officer (G/AO)** is an individual who has legal responsibility and authority for the business and financial management of grants and cooperative agreements; the **Contracting Officer (CO)** is an individual who has legal responsibility and authority for the business and financial management of contracts related to awards.
- The **RIO Liaison** (formerly LFO Liaison)⁸ is the RIO's designated project management advisor and serves as the IPT's primary resource for assistance with all policy, process, and procedural issues related to Mid-scale RI awards.
- The **Cost Analyst (CA)** is an individual from NSF's Cost Analysis and Pre-Award (CAP) Branch and is responsible for performing independent cost reviews of proposals and monitoring recipients' financial practices for awards greater than \$20 million; it also performs these tasks as requested for awards under \$20 million.

AUDIT OBJECTIVE AND SCOPE

The objective of this performance audit was to determine whether NSF has sufficient policies and procedures in place to enable it to conduct oversight of Mid-scale RI awards

⁸ Because NSF has not published a new RIG since LFO changed its name to RIO, the RIO Liaison's position in the organization chart is identified as the LFO Liaison.

and ensure awardees are able to meet program objectives. To achieve this objective, we considered NSF's policies, processes, controls, award management environment, and oversight capabilities for the Mid-scale RI portfolio and reviewed the oversight activities NSF IPTs performed for 12 judgmentally sampled Mid-scale RI awards, as illustrated in Table 1 below.

Table 1: Mid-scale RI Awards Selected for the Audit Sample

NSF Award No.	Funding Program	NSF Award No.	Funding Program
	Mid-scale RI-1		Mid-scale RI-2
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-2		Mid-scale RI-Other
	Mid-scale RI-2		Mid-scale RI-Other

Source: Auditor summary of awards selected for further audit testing.

We conducted this audit in accordance with *Generally Accepted Government Auditing Standards* (GAGAS), issued by the Comptroller General of the United States. [Appendix B](#) provides additional detailed information regarding the audit objectives, scope, and methodology used for this engagement.

AUDIT RESULTS

We found that NSF (1) did not have sufficient policies and procedures in place to ensure it consistently conducted oversight procedures for Mid-scale RI program awards, and (2) did not always perform adequate award oversight activities to ensure awardees complied with relevant guidance. Although NSF IPTs regularly performed monitoring activities on Mid-scale RI awards to ensure awardees were able to meet program objectives, NSF could reduce its financial and management risks by making improvements in the oversight of Mid-scale RI program awards. These improvements include:

- Consistently coding and tracking Mid-scale RI awards.
- Verifying awards are proposed and awarded in accordance with Mid-scale RI guidance.
- Establishing timely proposal, award, monitoring, and reporting guidance.
- Performing the award oversight activities required to ensure awardees comply with relevant Mid-scale RI guidance.

NSF stated that, since we began our audit, it has implemented steps that will potentially improve and clarify the oversight responsibilities applicable to Mid-scale RI awards. Specifically, NSF stated that it has centralized Mid-scale RI award administration and management activities within DACS and is updating sections of the RIG to clarify areas that the recipient community and IPT members have indicated could benefit from further guidance. Although these changes may be responsive to our report recommendations, because the changes did not occur during the audit period, we did not consider them when reporting our observations and recommendations.

NSF Did Not Consistently Code or Track Mid-Scale RI Awards

NSF tracks all awards in its Mid-scale RI portfolio within RIO's *Research Infrastructure List*. RIO noted that it maintains and updates this list quarterly to ensure it is accurate and complete and is based on the best available information. However, NSF did not consistently code or otherwise identify awards it considers to be within its Mid-scale RI portfolio in accordance with its most recent *Program and Financial Coding Manual*.⁹ As a result, we could not rely on NSF's financial systems to ensure its *Research Infrastructure List* was accurate and complete.

NSF Did Not Consistently Code or Otherwise Identify Mid-scale RI-1 Awards

NSF did not assign Mid-scale RI-1 program codes to the awards identified within the Mid-scale RI-1 award list in accordance with NSF guidance.¹⁰ Specifically, the Mid-scale RI-1 award list included two awards¹¹ to which NSF did not assign Mid-scale RI-1 program codes¹² and excluded two awards¹³ to which NSF had assigned Mid-scale RI-1 program element codes.¹⁴

NSF Did Not Consistently Code or Otherwise Identify Mid-scale RI-Other Awards

NSF did not consistently code, name, or otherwise identify the awards included in the Mid-scale RI-Other award list. Specifically, we noted that the list included nine National Hazards Engineering Research Infrastructure (NHERI) awards¹⁵ that NSF awarded prior to 2019 but excluded five other pre-2019 NHERI awards.¹⁶ The list also excluded four current NHERI awards¹⁷ but included one award¹⁸ assigned a Mid-scale RI-1 program element code. Further, we noted

⁹ NSF's Fiscal Year (FY) 2023 *Program and Financial Coding Manual 21*, Appendix 3.5, *Guidance for Coding of Mid-scale RI Awards*, identifies the program element, thematic, account, budget object class, and other codes that NSF should use when coding Mid-scale RI awards.

¹⁰ NSF's FY 2023 *Program and Financial Coding Manual 21*, Appendix 3.5, *Guidance for Coding of Mid-scale RI Awards*, states that NSF should identify investments associated with Track 1 of the Mid-scale RI program using a 108Y program element code and a 108Y00 program code.

¹¹ NSF Award Nos. [REDACTED] and [REDACTED]

¹² NSF stated that, because NSF divisions fund these awards, rather than the Mid-scale RI-1 program, NSF did not assign the awards a Mid-scale RI-1 program code. However, because both awards relate to proposals that awardees submitted in response to a Mid-scale RI-1 program solicitation, NSF does track and monitor the awards as Mid-scale RI-1 awards.

¹³ NSF Award Nos. [REDACTED] and [REDACTED]

¹⁴ NSF stated that, because Award No. [REDACTED] is associated with an existing facility funded by a Mid-scale RI-Other award and because Award No. [REDACTED] is a cost analysis award associated with an interagency agreement with the U.S. Army Corp of Engineers, NSF had appropriately excluded these awards from the Mid-scale RI-1 award list.

¹⁵ NSF Award Nos. [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] and [REDACTED]

¹⁶ NSF Award Nos. [REDACTED] [REDACTED] [REDACTED] [REDACTED] and [REDACTED]

¹⁷ NSF Award Nos. [REDACTED] [REDACTED] and [REDACTED]

¹⁸ NSF Award No. [REDACTED]

that, because NSF awarded Mid-scale RI-Other awards¹⁹ at amounts that were not within the Mid-scale RI funding threshold that the AICA established,²⁰ we could not use award amounts to identify Mid-scale RI-Other awards.

Because NSF's current coding guidance was not available when NSF first began funding Mid-scale RI awards and NSF personnel do not consistently follow this guidance, NSF cannot rely on its financial systems to independently verify that the *Research Infrastructure List* is complete or accurate. Without a systematic, verifiable method of identifying all awards within its Mid-scale RI portfolio, NSF risks not appropriately identifying or monitoring awards that it should include in its Mid-scale RI portfolio and *Research Infrastructure List*.

NSF DID NOT ALWAYS VERIFY MID-SCALE RI AWARDS WERE PROPOSED AND AWARDED IN ACCORDANCE WITH MID-SCALE RI GUIDANCE

NSF published an internal Standard Operating Guidance (SOG) in September 2022 that includes checklists that IPTs can use to ensure that NSF awards Mid-scale RI projects in accordance with Mid-scale RI guidance. However, because NSF published this guidance after it issued most of the awards included in the audit sample and because the SOG provides significant flexibility over how to award Mid-scale RI projects, IPTs could not always verify Mid-scale RI awards were proposed or awarded in accordance with the applicable guidance cited below.

NSF Awarded a Mid-scale RI-1 Award with a Project Type That Was Not in Accordance with the Mid-scale RI-1 Program Solicitation Guidance

NSF's Mid-scale RI-1 program solicitation instructions²¹ state that proposers may submit either an **implementation project** or a **design project** in response to Mid-scale RI-1 solicitations. However, NSF awarded one Mid-scale RI-1 award²² as a **development project**.²³

¹⁹ NSF awarded two of the sampled NSF awards (Award Nos. [REDACTED] and [REDACTED] at amounts under \$4 million, consistent with the applicable NSF program solicitations—NSF 18-564 (applicable to Award No. [REDACTED] and NSF 19-605 (applicable to NSF Award No. [REDACTED]—which allow proposers to request less than \$4 million for individual Mid-scale RI projects. NSF also awarded one sampled NSF award (Award No. [REDACTED] at an amount under \$4 million, which NSF stated was unsolicited and therefore this award not subject to a mid-scale program solicitation.

²⁰ Per the AICA, the term “mid-scale projects” means research instrumentation, equipment, and upgrades to major research facilities or other research infrastructure investments that exceed the maximum award funded by the major research instrumentation program (currently \$4 million) and are below the minimum award funded by the major research equipment and facilities construction program (currently \$100 million).

²¹ The NSF 19-537, NSF 21-505, and NSF 22-637: *Mid-scale Research Infrastructure-1* (Mid-scale RI-1) program solicitations, section *Synopsis of Program*, state that within “Mid-scale RI-1, proposers may submit two types of projects, ‘Implementation’ and ‘Design.’”

²² NSF Award No. [REDACTED]

²³ NSF stated that it had misclassified the project in its records as a result of a misuse of terminology by the proposing organization that carried through the proposal and award process. Specifically, NSF stated that, because the project title included the word “development,” NSF used that term when awarding the grant. Further, NSF stated that, based on its review of the program objectives, it had properly awarded the project as design activities under Mid-scale RI-1.

NSF Did Not Always Review or Award Budget Contingency in Accordance with NSF Practice

The MFG and RIG²⁴ both state that **budget contingency** is developed in accordance with widely accepted standards for risk assessment and planning and that NSF evaluates it for reasonableness through expert panels. Further, federal guidance²⁵ states that budget contingency represents an estimate of future costs associated with possible events, the precise outcome of which are indeterminable at the time of estimate. However, NSF did not always review or award budget contingency in accordance with this guidance. Specifically, NSF did not formally evaluate, oversee, and/or approve the use of budget contingency that it awarded for two Mid-scale RI-1 awards²⁶ because the NSF award documents did not include budget contingency under the “Contingency” section of the negotiated budget justification.²⁷ Additionally, NSF awarded budget contingency for one Mid-scale RI-1 award²⁸ at an amount that represented the known additional funds the awardee needed to cover the increase in a vendor’s quote to purchase equipment, rather than increasing the awardee’s equipment budget. Finally, NSF did not review or award budget contingency requested for one Mid-scale RI-1 award²⁹ because the IPT did not believe budget contingency was allowed.

NSF Did Not Always Document If or How It Verified Awardees Were Eligible to Receive Mid-scale RI Awards

NSF did not always document that it performed System for Award Management (SAM.gov) and Federal Awardee Performance and Integrity Information System (FAPIIS) searches to verify that awardees were eligible to receive NSF funds, as required by federal regulations³⁰ and NSF’s *Pre-Award Review Guidance*.³¹

²⁴ Section 4.2.5.2 of the MFG and RIG state that, for NSF, budget contingency covers the “known unknowns” and is used to mitigate identified cost or schedule risks as described in the Project Execution Plan (PEP).

²⁵ According to 2 Code of Federal Regulations (CFR) § 200.433, *Contingency provisions*, contingency is that part of a budget estimate of future costs (typically of large construction projects, information technology systems, or other items as approved by the federal awarding agency) that is associated with possible events or conditions arising from causes for which the precise outcome is indeterminable at the time of estimate and that experience shows will likely result, in aggregate, in additional costs for the approved activity or project.

²⁶ NSF Award Nos. [REDACTED] and [REDACTED]

²⁷ Section 4.2.2.4, *G.6 – Other* of the MFG and RIG states that budget contingency and allocations of contingency will be called out in the NSF agreement under the “Contingency” section, based on information provided in the negotiated budget justification.

²⁸ NSF Award No. [REDACTED]

²⁹ NSF Award No. [REDACTED]

³⁰ According to 2 CFR § 200.206, *Federal awarding agency review of risk posed by applicants*, (a)(2), the federal awarding agency is required to review the non-public segment of the Office of Management and Budget (OMB)-designated integrity and performance system accessible through SAM.gov (currently FAPIIS) prior to making a federal award in which the federal share is expected to exceed the simplified acquisition threshold.

³¹ Per BFA-DACS-FY20-03 REV 02, DACS/CSB Pre-Award Review Process – 13. Federal Oversight Systems Review and BFA-2022-3 Rev 0 Mid-scale Research Infrastructure – Pre-award Review Guidance – 11. Federal Oversight Systems Review, prior to making an award, the awarding official is required to review the non-public segment of the OMB-designated integrity and performance system accessible through SAM.gov and FAPIIS, in accordance with 2 CFR §200.206.

Specifically, although NSF guidance states that NST must perform this search and that it should maintain documentation in eJacket to support that it performed the search, NSF did not maintain documentation to support that it performed the search³² for five sampled awards.³³

Allowing IPTs to design and tailor the approach they use to review Mid-scale RI proposals and award Mid-scale RI projects appears appropriate based on the wide range of project types funded under the Mid-scale RI portfolio. However, without establishing guidance that ensures IPTs document how they verified that awardees propose—and NSF issues—Mid-scale RI awards in accordance with applicable NSF guidance, NSF risks inappropriately awarding Mid-scale RI awards in the future.

NSF Did Not Establish Timely Proposal, Award, Monitoring, and Reporting Guidance

IPTs noted that they considered guidance available in NSF program solicitations and the MFG/RIG when soliciting and awarding sampled Mid-scale RI awards. However, NSF did not publish SOGs identifying the specific steps IPTs should take when overseeing Mid-scale RI awards until July 25, 2022,³⁴ and September 30, 2022,³⁵ approximately 3 years after NSF issued its first formal Mid-scale RI program awards. As a result, many IPTs were required to rely on prior experience rather than on published guidance when determining how they should monitor these awards, which resulted in a wide range of oversight activities performed.

NSF Did Not Consistently Perform the Pre-Award Review Processes Recommended for Mid-scale RI Awards

NSF did not initially have formal guidance in place for IPTs to follow. Additionally, when NSF did publish formal guidance in 2022, it published multiple SOGs³⁶ and permitted IPTs to follow division-specific guidance.³⁷ As a result, IPTs did not complete pre-award review processes consistent with

³² Although NSF only specifically uploaded the SAM.gov/FAPIIS results into eJacket for three of the sampled awards, we did not note exceptions for another four sampled awards for which NSF provided support that it performed other reviews in which it considered the awardee's eligibility.

³³ NSF Award Nos. [REDACTED], [REDACTED], [REDACTED], [REDACTED], and [REDACTED].

³⁴ NSF issued its BFA-DACS-FY20-03, *DACS/CSB Pre-Award Review Process* SOG on July 25, 2022. This SOG described the pre-award business/financial review and cost analysis process for evaluating Major Facility and Mid-scale awards that DACS managed.

³⁵ NSF issued its Mid-scale RI – *Pre-award Review Guidance* SOG on September 30, 2022. This SOG provided NSF Awarding Officials with the necessary steps and procedures for the pre-award business/ financial review and cost analysis process for evaluating the proposal and budget for Mid-Scale RI awards that DACS or DGA managed.

³⁶ Both the BFA-DACS-FY20-03 Rev 01 *DACS/CSB Pre-Award Review Process* SOG and the BFA 2022-3 Rev 0 *Mid-scale RI – Pre-award Review Guidance* SOG include recommendations for activities that NSF should perform during the pre-award phase of a Mid-scale RI award.

³⁷ NSF stated that the pre-award review processes used for the sampled Mid-scale RI projects varied based on which office managed the Mid-scale RI award. Specifically, NSF noted that personnel generally followed guidance from DACS if DACS was managing the award but would have followed guidance from DGA if DGA was managing the award.

applicable program solicitations³⁸ or NSF's MFG/RIG. Specifically, NSF did not review the **Project Execution Plan** (PEP) for one sampled award³⁹ to determine whether it included all of the elements that NSF recommended⁴⁰ because NSF was only funding a small portion of the proposed project. Finally, NSF issued one sampled award⁴¹ before it created a **performance measurement baseline** against which it could evaluate the award, which is not consistent with NSF guidance.⁴²

NSF Did Not Verify Whether External Reviewers Considered All Relevant Merit Review Criteria

NSF program solicitations⁴³ require that NSF evaluate all proposals using two NSB-approved merit criteria (intellectual merit and broader impacts), as well as additional solicitation-specific review criteria as applicable, based on the type of award proposed. Although external reviewers did evaluate the two NSB-approved merit criteria for each proposal, the external reviewers did not evaluate the additional solicitation-specific review criteria applicable per the relevant program solicitations for 10 of the sampled awards.⁴⁴

NSF Did Not Develop or Follow Project Award-Specific Management Plans (MPs)

The MFG and RIG both state that the Mid-scale RI PO is responsible for creating an **MP** for each project to document key project characteristics, the planned oversight approach, and any extraordinary exceptions or additions to applicable guidance.⁴⁵ However, POs did not establish project-specific MPs for any of the sampled Mid-scale awards. Rather, POs used the MPs that NSF established at the

³⁸ NSF 19-537 (applicable to NSF Award Nos. [REDACTED] and [REDACTED] NSF 21-505 (applicable to NSF Award No. [REDACTED] NSF 19-542 (applicable to NSF Award Nos. [REDACTED] and [REDACTED] NSF 18-564 (applicable to NSF Award No. [REDACTED] NSF 15-519 (applicable to NSF Award No. [REDACTED] NSF 19-605 (applicable to NSF Award No. [REDACTED] NSF 15-598 (applicable to NSF Award No. [REDACTED] and NSF 19-602 (applicable to NSF Award No. [REDACTED] each include a *Merit Review Criteria* section that identifies the criteria NSF stated that it would use to evaluate the proposals submitted in response to the solicitation.

³⁹ NSF Award No. [REDACTED]

⁴⁰ Section 5 of the RIG, *Guidance for Mid-Scale Research Infrastructure Projects, Programmatic Deliverables*, identifies all of the elements NSF recommends be included within a PEP, unless otherwise justified.

⁴¹ NSF Award No. [REDACTED]

⁴² Per Section 5 of the RIG, *Guidance for Mid-Scale Research Infrastructure Projects, Programmatic Deliverables*, NSF should define the project management baseline at the time of the award, as all reporting is done against this project baseline.

⁴³ NSF 19-537 (applicable to NSF Award Nos. [REDACTED] and [REDACTED] NSF 19-542 (applicable to NSF Award Nos. [REDACTED] and [REDACTED] NSF 18-564 (applicable to NSF Award No. [REDACTED] NSF 19-605 (applicable to NSF Award No. [REDACTED] NSF 21-505 (applicable to NSF Award No. [REDACTED] and NSF 19-602 (applicable to NSF Award No. [REDACTED] each include a *Merit Review Principles and Criteria* section that identifies the NSB merit review criteria and the additional solicitation-specific review criteria against which NSF will evaluate the proposals submitted in response to the program solicitation.

⁴⁴ NSF Award Nos. [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] and [REDACTED]

⁴⁵ Per Section 5 of the MFG and RIG, *Guidance for Mid-Scale Research Infrastructure Projects, Programmatic Deliverables*, the PO creates an MP to document key project characteristics, the planned oversight approach, and any extraordinary exceptions or additions to the guidance presented in this section as part of the program solicitation development, in accordance with NSF policy.

program solicitation level⁴⁶ for 10 sampled awards⁴⁷ and did not develop MPs for 2 sampled awards⁴⁸ because the awardees did not submit project proposals in response to an NSF program solicitation.⁴⁹ Further, the IPT for one sampled award⁵⁰ stated that it did not manage the award as outlined in the applicable MP⁵¹ because the team members were too busy with other regular meetings they were required to attend.

NSF Did Not Consistently Document How It Reviewed Proposal Budgets or Schedules

External panel reviewers often reviewed the proposed budget and/or proposed schedule as part of the award proposal evaluation process. However, IPTs did not always document whether or how they evaluated the proposal budgets and/or schedules in accordance with NSF's *Guidance for Mid-scale RI Projects*⁵² or NSF pre-award SOGs.⁵³ Specifically, NSF did not review, or document its review of, the awardee's proposed project budget to evaluate whether the awardee created the budget in accordance with the U.S. Government Accountability Office's (GAO's) *Cost Estimating and Assessment Guide*⁵⁴ for four sampled awards.⁵⁵ Additionally, NSF did not review, or document its review of, the awardee's proposed budget contingency consistent with NSF pre-award SOGs⁵⁶ before awarding budget contingency for five of the sampled awards.⁵⁷ Further, NSF did not evaluate, or document its evaluation of, whether the

⁴⁶ Although NSF's Proposal and Award Manual (PAM), effective March 18, 2019, Chapter II, Section D, *Management Plans*, states that every program announcement and solicitation must have an accompanying MP, the use of these MPs for Mid-scale awards is not consistent with the language included in the MFG or RIG.

⁴⁷ NSF Award Nos. [REDACTED] and [REDACTED]

⁴⁸ NSF Award Nos. [REDACTED] and [REDACTED]

⁴⁹ Although NSF stated that the awardees for these two awards did not submit proposals in response to a program solicitation, the NSF award documents identify NSF 15-519 as the applicable solicitation for NSF Award No. [REDACTED] and NSF 15-598 as the applicable solicitation for NSF Award No. [REDACTED]

⁵⁰ NSF Award No. [REDACTED]

⁵¹ The IPT stated that it did not follow the applicable NSF Mid-scale RI-2 21-505 MP when overseeing this award.

⁵² See Section 5, *Guidance for Mid-Scale Research Infrastructure Projects, PO Oversight, Interaction with the Office of Budget, Finance and Award Management (BFA) and Integrated Project Teams*, in NSF's MFG and RIG.

⁵³ The BFA-DACS-FY20-03 Rev 01 *DACS/CSB Pre-Award Review Process* SOG and the BFA 2022-3 Rev 0 Mid-scale RI – *Pre-award Review Guidance* SOG include recommendations for activities that NSF should perform during the pre-award phase of a Mid-scale RI award.

⁵⁴ The BFA-DACS-FY20-03 Rev 01 *DACS/CSB Pre-Award Review Process* SOG, Section 7.2, *Develop Business, Financial and Administrative Review Strategy*, and the BFA 2022-3 Rev 0 Mid-scale RI – *Pre-award Review Guidance* SOG state that a member of the IPT must consider the best practices in GAO's *Cost Estimating and Assessment Guide* when the IPT is developing its cost analysis strategy.

⁵⁵ NSF Award Nos. [REDACTED] and [REDACTED]

⁵⁶ The BFA-DACS-FY20-03 Rev 01 *DACS/CSB Pre-Award Review Process* SOG and the BFA 2022-3 Rev 0 Mid-scale RI – *Pre-award Review Guidance* SOG include recommendations for how NSF should review budget contingency.

⁵⁷ NSF Award Nos. [REDACTED] and [REDACTED]

awardees developed the schedules provided for two sampled awards⁵⁸ in accordance with GAO's *Schedule Assessment Guide*.⁵⁹

NSF Did Not Always Perform—or Document Performance of— FL-99 Reviews/Independent Cost Estimate Reviews (ICERs)

NSF uses ICERs, including CAP *FL-99 Reviews*, to validate recipient cost estimates and ensure the recipient has proposed a high-quality and defensible estimate to make decisions, budget, and facilitate the science mission.⁶⁰

Although NSF guidance does not require ICERs for projects with an estimated award amount under \$20 million, NSF performed ICERs for all but two of the sampled awards.⁶¹ IPTs requested FL-99 reviews for the other 10 sampled awards; however, NSF did not create a Memorandum for the Record, or similar document that outlined the CAP recommendations and proposed resolutions required for FL-99 reviews,⁶² for 3 of the sampled awards.⁶³ Additionally, for one of these awards,⁶⁴ *NSF's Division of Institution and Award Support (DIAS)* did not complete the FL-99 review until after NSF had already issued the award.

NSF IPT Members Could Not Always Verify That Personnel Performed the Recommended Proposal/Award Activities

NSF has not developed a formal process for performing, or documenting the performance of, oversight activities and/or for transitioning the responsibilities for key positions when personnel leave or change positions. The current IPT members for sampled awards could not always verify that personnel had performed the proposal and award activities recommended in NSF's *Guidance for Mid-scale RI Projects*⁶⁵ or in NSF pre-award SOGs.⁶⁶ Specifically, we were

⁵⁸ NSF Award Nos. [REDACTED] and [REDACTED]

⁵⁹ Section 14 of the BFA-DACS-FY20-03 Rev 01 *DACS/CSB Pre-Award Review Process* SOG and Section 12 of the BFA 2022-3 Rev 0 *Mid-scale RI – Pre-award Review Guidance* SOG, *Schedule Review*, state that awardees are required to develop the project schedule in accordance with the best practices outlined in the GAO *Schedule Assessment Guide* and that a member of the IPT should obtain documentation to support that NSF assessed the schedule in accordance with the GAO *Schedule Assessment Guide*.

⁶⁰ Per NSF's Office of Budget, Finance, and Award Management SOG, dated June 30, 2019 (NSF-LFO-FY 19-01), Subject: *Selection of Independent Cost Estimate Reviews*, Section 1, *Purpose*.

⁶¹ NSF Award Nos. [REDACTED] and [REDACTED]

⁶² Per BFA-DACS-FY20-03, REV 02, *DACS/CSB Pre-Award Review Process*, section 8.3, *CAP Budget Review Recommendation*, in resolving any recommendations from DIAS, a member of the IPT will document any exceptions to DIAS' recommendations through a Memorandum for the Record explaining the circumstances and reasons for the exceptions and should outline the following: (1) the CAP recommendation, (2) relevant background information, (3) recipient response, and (4) explanation of the G/AO's determination and proposed resolution.

⁶³ NSF Award Nos. [REDACTED] [REDACTED] and [REDACTED]

⁶⁴ NSF Award No. [REDACTED]

⁶⁵ See Section 5, *Guidance for Mid-Scale Research Infrastructure Projects, PO Oversight, Interaction with the Office of Budget, Finance and Award Management (BFA) and Integrated Project Teams*, in NSF's MFG and RIG.

⁶⁶ The BFA-DACS-FY20-03 Rev 01 *DACS/CSB Pre-Award Review Process* SOG and the BFA 2022-3 Rev 0 *Mid-scale RI – Pre-award Review Guidance* SOG include recommendations for activities that NSF should perform during the pre-award phase of a Mid-scale RI award.

unable to determine what actions (1) the G/AOs performed when issuing and administering 10 sampled awards,⁶⁷ (2) the RIO Liaisons performed when evaluating proposals for 3 sampled awards,⁶⁸ or (3) the CAs performed when reviewing proposals for 5 sampled awards.⁶⁹ In these instances, NSF did not provide any documentation—and/or there was no documentation available in eJacket—to support that personnel addressed these actions, and we were unable to contact the individual who served in that position at the time the award was proposed/awarded.⁷⁰

NSF IPT Members Did Not Always Complete Recommended Proposal or Award Activities

IPT members stated they did not perform, and were not required to perform, all proposal and award activities included in NSF's pre-award SOGs⁷¹ because the SOGs were not available when the majority of the sampled awards were proposed/awarded. Further, the IPT for one NSF award⁷² stated that it did not perform all the recommended Mid-scale RI pre-award steps because it did not consider the project to be a Mid-scale project when the awardee proposed it. Additionally, the RIO Liaison for one sampled NSF award⁷³ stated that they have not participated in award site visits because RIO does not have sufficient funding to enable RIO Liaisons to consistently participate in site visits.

Although NSF has published SOGs, checklists, and other guidance that contain information regarding how IPTs should review, award, monitor, and report on Mid-scale RI awards, the guidance varies based on which office is overseeing the program and was not published until after NSF created the Mid-scale RI-1 and Mid-scale RI-2 programs. Further, the IPTs did not always follow the guidance NSF had published at the time the sampled awards were proposed. Without establishing a clear, documented process that IPTs are required to follow when reviewing, awarding, monitoring, and reporting on Mid-scale RI proposals/awards before NSF makes the awards, IPTs may continue to lack a clear understanding of the processes they need to use to ensure they appropriately award and oversee projects within NSF's Mid-scale RI portfolio.

⁶⁷ NSF Award Nos. [REDACTED] and [REDACTED]

⁶⁸ NSF Award Nos. [REDACTED] and [REDACTED]

⁶⁹ NSF Award Nos. [REDACTED] and [REDACTED]

⁷⁰ NSF IPTs indicated that the individuals who served in these positions had retired, had left the agency, and/or were unavailable as a result of having a new position at the agency.

⁷¹ The BFA-DACS-FY20-03 Rev 01 *DACS/CSB Pre-Award Review Process* SOG and the BFA 2022-3 Rev 0 *Mid-scale RI – Pre-award Review Guidance* SOG include recommendations for activities that NSF should perform during the pre-award phase of a Mid-scale RI award.

⁷² NSF Award No. [REDACTED]

⁷³ NSF Award No. [REDACTED]

NSF DID NOT ALWAYS PERFORM MID-SCALE RI AWARD OVERSIGHT ACTIVITIES REQUIRED TO ENSURE AWARDEES COMPLIED WITH RELEVANT GUIDANCE

NSF's processes for overseeing Mid-scale RI awards were not sufficient to ensure awardees consistently complied with relevant NSF policies, procedures, and/or other applicable regulations.

Awardee Mid-scale RI Proposals Did Not Contain All Recommended Elements

NSF's *Guidance for Mid-scale RI Projects*⁷⁴ states that Mid-scale RI proposals should include estimates for all stages of the project life cycle, as well as a **Concept of Operations (COO)** discussion, strategy, and timeline for divestment. However, NSF approved proposals for awards that did not include either this information or a justification for why the awardee did not include the information. Specifically, NSF approved seven sampled award proposals⁷⁵ that did not include actual and budgeted cost estimates for all project life cycles. Additionally, NSF approved eight sampled award proposals⁷⁶ that did not include a COO discussion or a strategy for eventual divestment of the infrastructure and close-out of the project.

Awardee PEPs Did Not Contain All Recommended Elements

Although NSF's *Guidance for Mid-scale RI Projects*⁷⁷ includes specific PEP elements and project details that should be included in awardee PEPs, NSF approved PEPs that did not include either all of the recommended information or a justification as to why the awardee did not include the information. Specifically, NSF approved eight sampled award PEPs⁷⁸ that did not include all recommended elements. Further, NSF approved nine sampled award PEPs⁷⁹ that did not include all of the recommended project details for each of the recommended PEP elements.

Awardees Did Not Consistently Create PEPs

Although NSF's *Guidance for Mid-scale RI Projects*⁸⁰ states that PEPs are required for all mid-scale projects, NSF awarded Mid-scale RI awards without requiring the awardees to provide PEPs. Specifically, NSF awarded two sampled Mid-scale RI awards⁸¹ for which awardees did not create the required PEPs⁸² and accepted

⁷⁴ See Section 5, *Guidance for Mid-Scale Research Infrastructure Projects*, in NSF's MFG and RIG.

⁷⁵ NSF Award Nos. [REDACTED] and [REDACTED]

⁷⁶ NSF Award Nos. [REDACTED] and [REDACTED]

⁷⁷ See Section 5, *Guidance for Mid-Scale Research Infrastructure Projects, Programmatic Deliverables*, in NSF's MFG and RIG.

⁷⁸ NSF Award Nos. [REDACTED] and [REDACTED]

⁷⁹ NSF Award Nos. [REDACTED] and [REDACTED]

⁸⁰ See Section 5, *Guidance for Mid-Scale Research Infrastructure Projects, Programmatic Deliverables*, in NSF's MFG and RIG.

⁸¹ NSF Award Nos. [REDACTED] and [REDACTED]

⁸² The PO for Award No. [REDACTED] stated that the awardee did not create a PEP for the project because the project was not part of the Mid-scale RI but was instead part of a separate program. The PO for NSF Award No. [REDACTED] stated that the awardee did not create a PEP for the project because it was an operations award.

an “Operations Project Execution Plan” (OPEP)⁸³ rather than a PEP for one sampled award.⁸⁴

Awardees Did Not Receive Formal PEP Approvals

Although NSF’s *Guidance for Mid-scale RI Projects*⁸⁵ requires that NSF approve all Mid-scale RI PEPs, NSF did not formally document approvals for the nine sampled NSF awards for which the awardees submitted PEPs.⁸⁶

Awardees Did Not Submit Mid-scale RI Annual Reports Before the Applicable Due Dates

Although NSF program solicitations⁸⁷ require awardees to submit annual project reports no later than 90 days prior to the end of the current budget period, for 10 of the sampled awards, awardees did not submit one or more annual reports on or before the applicable due dates.⁸⁸

Without providing Mid-scale RI awardees with appropriate guidance and/or conducting oversight activities sufficient to evaluate whether awardees are complying with relevant practices, NSF risks awardees continuing to misunderstand or fail to comply with relevant NSF guidance and/or not appropriately achieving program objectives.

RECOMMENDATIONS

We recommend that NSF’s Office of Budget, Finance, and Award Management (BFA) and Chief Officer for Research Facilities (CORF) take the following actions:

1. Implement additional policies, processes, and/or procedures to ensure that NSF assigns program element, thematic, account, budget object class, and/or other codes consistent with its *Guidance for Coding of Mid-scale RI Awards* for all awards NSF includes within its Mid-scale Research Infrastructure (Mid-scale RI) portfolio.
2. Revise existing internal guidance and procedures that Integrated Project Teams (IPTs) can use to improve the review, approval, and oversight process for Mid-scale RI awards.

⁸³ The PO stated that the awardee did not create a PEP for this project because the project was an operations award and that the awardee created the OPEP to provide more information to proposal reviewers.

⁸⁴ NSF Award No. [REDACTED]

⁸⁵ See Section 5, *Guidance for Mid-Scale Research Infrastructure Projects, Programmatic Deliverables*, in NSF’s MFG and RIG.

⁸⁶ NSF Award Nos. [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] and [REDACTED]

⁸⁷ NSF 19-537 (applicable to NSF Award Nos. [REDACTED] [REDACTED] and [REDACTED] NSF 21-505 (applicable to NSF Award No. [REDACTED] NSF 19-542 (applicable to NSF Award Nos. [REDACTED] [REDACTED] and [REDACTED] NSF 18-564 (applicable to NSF Award No. [REDACTED] NSF 15-598 (applicable to NSF Award No. [REDACTED] and NSF 19-605 (applicable to NSF Award No. [REDACTED] each include a *Reporting Requirements* section that states that the Principal Investigator must submit an annual project report to the cognizant PO no later than 90 days prior to the end of the current budget period.

⁸⁸ NSF Award Nos. [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] and [REDACTED]

3. Update and/or develop external Mid-scale RI guidance for proposing organizations to identify and/or clarify NSF's expectations for the proposal, award, monitoring, and reporting activities required for different types of Mid-scale RI awards.
4. Implement a formal process for documenting NSF's oversight, as well as the performance of the activities funded under Mid-scale RI awards, and for appropriately storing and archiving this documentation within NSF's eJacket system (or another appropriate system) on a timely basis.
5. Produce and provide additional training to IPTs responsible for overseeing Mid-scale RI awards.

RESPONSE

National Science Foundation Response: NSF stated that, although it does not believe that all the criteria cited in this report were applicable to each sampled award, it agrees with all five recommendations. NSF also stated that it intends to develop a corrective action plan that leaves substantial professional judgment to the program officers and BFA staff responsible for overseeing Mid-scale awards, which NSF believes is necessary given the variety of its Mid-Scale programs.

Auditors' Additional Comments: Our position regarding this finding has not changed. Specifically, NSF noted, and we acknowledge, that some of the sampled awards began before NSF created applicable guidance. As outlined in the report, we believe that because NSF did not publish this guidance prior to issuing the awards, this resulted in a control environment that allowed for inconsistent Mid-scale award management and oversight. Further, because this guidance was published after the awards became effective, NSF did not award, code, and monitor the awards consistent with one another or with their respective program solicitations. We acknowledge and appreciate that NSF has been continually updating its Mid-scale RI program guidance and will continue to evolve the program through its corrective action plan. We have included NSF's response to this report in [Appendix A](#).

Sikich CPA LLC

October 24, 2024

APPENDIX A: NSF'S RESPONSE



U.S. National Science Foundation
WHERE DISCOVERIES BEGIN

MEMORANDUM

Date: October 4, 2024

To: Theresa S. Hull, Assistant Inspector General
Audits, Inspection and Evaluations

JANIS A
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PIESTER

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Date: 2024.10.04
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From: Janis Coughlin-Piester, BFA Office Head & Chief Financial Officer
Linnea Avallone, Chief Officer for Research Facilities Linnea
Avallone

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Avallone
Date: 2024.10.04
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Subject: *Performance Audit of NSF's Mid-scale Research Infrastructure Programs*

The National Science Foundation (NSF) appreciates the opportunity to review and provide comments on the OIG's draft audit report. We also greatly appreciated the frequent dialog with your office and your contractor, Sikich, during the audit that enabled technical clarification and NSF to substantiate many of the actions the agency has already taken on Mid-scale Research Infrastructure (RI) oversight. NSF considers its stewardship over federal funds a high priority and oversight of our Mid-scale RI programs is an important element of sound stewardship.

Although our view remains that the audit report evaluates NSF against guidance that did not exist at the time of award for some in the audit sample, we agree with all five of Sikich's recommendations. As we develop our Corrective Action Plan, we intend to leave substantial professional judgement to the program officers and BFA staff overseeing mid-scale awards to properly scale pre- and post-award oversight to the size, complexity, and technical nature of the activities funded under the award, be it design, implementation or operations. This is essential because of the technical variability of our Mid-scale RI programs as well as the broad range in total project cost bounded by statute. NSF's Corrective Action Plan will show that many of the actions to resolve and close the recommendations are already in progress.

On behalf of the NSF staff participating in the engagement, we want to acknowledge the OIG and Sikich staff for their diligence and commitment to understanding NSF's oversight processes. We look forward to receiving the final report. If you have any questions, please contact Roland Roberts at [REDACTED]@nsf.gov (x[REDACTED]) or Matthew Hawkins at [REDACTED]@nsf.gov (x[REDACTED]).

cc: Allison Lerner
Ken Lish
Christina Sarris
Roland Roberts

Jason Bossie
Matthew Hawkins
Patrick Breen
Timothy Kashmer

APPENDIX B: AUDIT OBJECTIVE, SCOPE, AND METHODOLOGY

OBJECTIVE

The National Science Foundation Office of Inspector General contracted Sikich CPA LLC (formerly known as Cotton & Company Advisory and Assurance, LLC) to conduct a performance audit of NSF with the goal of evaluating NSF’s Mid-scale Research Infrastructure (Mid-scale RI) program policies, processes, controls, award management environment, and oversight capabilities. Specifically, the audit objective was to determine whether NSF has sufficient policies and procedures in place to enable it to conduct oversight of Mid-scale RI program awards⁸⁹ and ensure awardees are able to meet program objectives.

SCOPE

The scope of this audit involved reviewing the policies, processes, controls, and award management environment NSF used to conduct oversight of the awards it considered to be within its Mid-scale RI portfolio as of August 1, 2023, the date of the audit notification letter. Although we were unable to verify the accuracy and completeness of the NSF Research Infrastructure Office’s (RIO’s) *Research Infrastructure List*, updated in August 2023—as detailed in the *NSF Did Not Consistently Code or Track Mid-scale RI Awards* observation in this report—we determined that the scope of our audit included 22 Mid-scale RI-1 awards, 8 Mid-scale RI-2 awards, and 48 Mid-scale RI-Other (Divisional, including solicited and unsolicited) (Mid-scale RI-Other) awards, as summarized in Table 1 below.

Appendix B, Table 1: Mid-scale RI Awards in the Audit Population

NSF Award No.	NSF Award Type	NSF Award No.	NSF Award Type
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other

⁸⁹ Although the audit objective outlined in our statement of work notes that we will review NSF’s oversight of Mid-scale RI program “operations” rather than “awards”, because “operations” is a specific Mid-scale RI life-cycle stage that is referred to throughout the report, we have used “awards” rather than “operations” when referring to the audit objective.

NSF Award No.	NSF Award Type	NSF Award No.	NSF Award Type
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-2		Mid-scale RI-Other
	Mid-scale RI-2		Mid-scale RI-Other
	Mid-scale RI-2		Mid-scale RI-Other
	Mid-scale RI-2		Mid-scale RI-Other
	Mid-scale RI-2		Mid-scale RI-Other
	Mid-scale RI-2		Mid-scale RI-Other
	Mid-scale RI-2		Mid-scale RI-Other
	Mid-scale RI-Other		Mid-scale RI-Other
	Mid-scale RI-Other		Mid-scale RI-Other
	Mid-scale RI-Other		Mid-scale RI-Other
	Mid-scale RI-Other		Mid-scale RI-Other
	Mid-scale RI-Other		Mid-scale RI-Other
	Mid-scale RI-Other		Mid-scale RI-Other
	Mid-scale RI-Other		Mid-scale RI-Other
	Mid-scale RI-Other		Mid-scale RI-Other
	Mid-scale RI-Other		Mid-scale RI-Other

Source: Auditor summary of Mid-scale RI awards included within the audit scope.

After identifying the awards that should be included within the audit scope, we judgmentally selected a sample of the awards for further testing. Specifically, we reviewed the oversight activities performed on 12 sampled awards, as outlined in Table 2:

Appendix B, Table 2: Mid-scale RI Awards Selected for the Audit Sample

NSF Award No.	NSF Award Type	NSF Award No.	NSF Award Type
	Mid-scale RI-1		Mid-scale RI-2
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-1		Mid-scale RI-Other
	Mid-scale RI-2		Mid-scale RI-Other
	Mid-scale RI-2		Mid-scale RI-Other

Source: Auditor summary of awards selected for further audit testing.

In addition to considering the results of the testing performed on the 12 sampled awards identified above, our audit scope included considering information gained from audits that we performed to evaluate whether NSF awardees complied with relevant Mid-scale RI guidance when administrating 4 of the sampled awards (Award Nos. [REDACTED] [REDACTED] [REDACTED] and [REDACTED]). Accordingly, we considered the results of the following audits when performing this audit:

- **Performance Audit of Mid-Scale Research Infrastructure Incurred Costs – The Ohio State University** (NSF Award No. [REDACTED])

- **Performance Audit of Mid-Scale Research Infrastructure Incurred Costs – Smithsonian Astrophysical Observatory** (NSF Award No. [REDACTED])
- **Performance Audit of Mid-Scale Research Infrastructure Incurred Costs – Monterey Bay Aquarium Research Institute** (NSF Award No. [REDACTED])
- **Performance Audit of Mid-Scale Research Infrastructure Incurred Costs – University of Connecticut Health Center** (NSF Award No. [REDACTED])

METHODOLOGY

To develop the audit scope and design procedures that allowed us to achieve the audit objectives identified above, we performed our planning procedures, including: (1) hosting an entrance conference; (2) identifying applicable federal, NSF, program, and audit criteria; (3) conducting preliminary planning interviews to discuss NSF's role(s) in overseeing Mid-scale RI awards virtually with NSF staff in Alexandria, Virginia; (4) documenting the oversight tools and processes NSF has in place to oversee the Mid-scale RI awards; (5) identifying NSF awards that should be included in the audit population; and (6) selecting a sample of awards for further testing.

Specifically, as part of our planning, we noted that NSF published a variety of policies, procedures, Standard Operating Guides (SOGs), and other guidance applicable to the Mid-scale RI program that we considered during the audit, as outlined in the table below:

Appendix B, Table 3: Policies, Procedures, SOGs, and Other Guidance Applicable to Mid-scale RI Awards

NSF Policy, Procedure, SOG, or Guidance	Guidance Date	Guidance Generally Applicable to: ⁹⁰			
		Mid-scale RI-1	Mid-scale RI-2	Other	Applicability Notes
NSF 19-068, Major Facilities Guide (MFG)	September 2019	Yes	Yes	Yes	Replaced by the RIG
NSF 21-107, Research Infrastructure Guide (RIG)	December 2021	Yes	Yes	Yes	
NSF's Proposal and Award Manual	03/18/2019	Yes	Yes	Yes	
2017 American Innovation and Competitiveness Act (AICA), Section 109	01/06/2017	Yes*	Yes*	No	*Section 109 contains no oversight requirements. NSF responded to the AICA directives by creating the Mid-scale RI-1 and Mid-scale RI-2 programs.
Public Law 116-93, Section 518	12/20/2019	Yes	Yes	Yes	

⁹⁰ Although the referenced guidance is generally applicable to the RI-1, RI-2, and Other Mid-scale RI awards as summarized in the table, because NSF issued some of the awards included within its Mid-scale RI portfolio before the referenced guidance was available, not all RI-1, RI-2, and Other Mid-scale RI awards were subject to all guidance identified in the table.

NSF Policy, Procedure, SOG, or Guidance	Guidance Date	Guidance Generally Applicable to: ⁹⁰			
		Mid-scale RI-1	Mid-scale RI-2	Other	Applicability Notes
Government Performance and Results Modernization Act of 2010	01/04/2011	Yes	Yes	Yes	
BFA 2020-1 Standard FL-99 Pre-award Reviews	06/01/2020	Yes*	Yes	Yes	*Although FL-99s are not required for Mid-scale RI-1 awards, this guidance was applicable to all of the Mid-scale RI-1 awards sampled as NSF performed FL-99s on each.
BFA 2022-3 Rev 0 Mid-scale RI – Pre-award Review Guidance SOG	09/30/2022	Yes	Yes	Yes	Applicable to DACS-CSB, DGA, DIAS, and RIO.
BFA-DACS-FY20-03 Rev 01 DACS/CSB Pre-Award Review Process SOG	02/25/2021	Yes*	Yes*	Yes*	*Only applicable to awards overseen by DACS/CSB.
NSF-LFO-FY16-02 Rev 01 Budget Contingency Obligation and Allocation SOG	01/09/2023	Yes	Yes	Yes	Applicable to DACS, DGA, RIO and Directorates/Divisions.
NSF-LFO-FY19-01 Rev 0 Selection of Independent Cost Estimate Reviews (ICERs)	06/30/2019	Yes	Yes	Yes	Applicable to DACS/CSB, DIAS, and RIO.
NSF 19-537 and Associated Mid-scale RI-1 Management Plan (MP)	11/21/2018	Yes	No	No	
NSF 21-505 and Associated Mid-scale RI-1 MP	10/07/2020	Yes	No	No	
NSF 19-542 and Associated Mid-scale RI-2 MP	12/12/2018	No	Yes	No	
NSF 21-537 and Associated Mid-scale RI-2 MP	12/04/2020	No	Yes	No	
NSF 18-564 and Associated Mid-scale RI-Other MP	06/14/2018	No	No	Yes*	*Only applicable to awards issued under these solicitations. ⁹¹
NSF 19-605 and Associated Mid-scale RI-Other MP	09/23/2019	No	No	Yes*	
NSF 19-602 and Associated Mid-scale RI-Other MP	09/12/2019	No	No	Yes*	

Source: Auditor summary of NSF policies, procedures, SOGs, and other guidance the audit team and/or NSF identified as applicable to the Mid-scale RI program and/or the sampled Mid-scale RI awards.

⁹¹ As Mid-scale RI-Other Awards can be issued in response to a variety of NSF Program Solicitations, these are not the only program solicitations and MPs applicable to Mid-scale RI-Other awards. Rather, these represent the program solicitations and MPs we discovered were applicable to the sampled Mid-scale RI-Other awards as a result of planning activities.

Additionally, as part of our planning, we evaluated whether internal controls and/or information systems were significant to the audit objectives. Specifically, we considered NSF's internal controls solely to understand NSF's policies, procedures, and information systems relevant to Mid-scale RI and to evaluate whether there were any overlaps or gaps in NSF's oversight of Mid-scale RI awards, as well as whether NSF could improve its oversight activities. Because we did not rely on information generated by NSF's information systems and determined that the effectiveness of NSF's information system controls was not significant to the audit, we did not evaluate NSF's information system controls.

After completing our planning activities, we provided our proposed audit plan to NSF OIG for review and approval. After obtaining NSF OIG's approval for our audit plan, we performed each of the approved audit steps for each of the 12 sampled NSF awards. These steps generally included reviewing the documentation that NSF provided and conducting interviews, as determined necessary, to obtain sufficient, appropriate evidence necessary to evaluate whether NSF awarded budgets and/or monitored and reported on Mid-scale RI awards consistent with relevant NSF policies, procedures, and SOGs. After completing our audit testing, we created a summary of reportable observations, including overlaps, gaps, and inconsistencies in NSF's oversight of Mid-scale RI awards, which we provided to NSF OIG and NSF personnel for review.

We conducted this performance audit in accordance with *Generally Accepted Government Auditing Standards* (GAGAS), issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

APPENDIX C: SUMMARY OF OBSERVATIONS

Appendix C, Table 1: Summary of Identified Observations

Observation	Sub-Observation	Award No.	Observations Noted
NSF Did Not Consistently Code or Track Mid-scale RI Awards	NSF Did Not Consistently Code or Otherwise Identify Mid-scale RI-1 Awards	██████	Award Was Included in NSF's Mid-scale RI-1 Award List but Was Not Assigned a Mid-scale RI-1 Program Code
		██████	Award Was Included in NSF's Mid-scale RI-1 Award List but Was Not Assigned a Mid-scale RI-1 Program Code
		██████	Award Was Assigned a Mid-scale RI-1 Program Code but Was Not Included in NSF's Mid-scale RI-1 Award List
		██████	Award Was Assigned a Mid-scale RI-1 Program Code but Was Not Included in NSF's Mid-scale RI-1 Award List
	NSF Did Not Consistently Code or Otherwise Identify Mid-scale RI-Other Awards	██████	Pre-2019 National Hazards Engineering Research Infrastructure (NHERI) Awards Excluded from NSF's Mid-scale RI-Other Awards List
		██████	Pre-2019 National Hazards Engineering Research Infrastructure (NHERI) Awards Excluded from NSF's Mid-scale RI-Other Awards List
		██████	Pre-2019 National Hazards Engineering Research Infrastructure (NHERI) Awards Excluded from NSF's Mid-scale RI-Other Awards List
		██████	Pre-2019 National Hazards Engineering Research Infrastructure (NHERI) Awards Excluded from NSF's Mid-scale RI-Other Awards List
		██████	Pre-2019 National Hazards Engineering Research Infrastructure (NHERI) Awards Excluded from NSF's Mid-scale RI-Other Awards List
		██████	Current NHERI Awards Excluded from NSF's Mid-scale RI-Other Awards List
		██████	Current NHERI Awards Excluded from NSF's Mid-scale RI-Other Awards List
		██████	Current NHERI Awards Excluded from NSF's Mid-scale RI-Other Awards List
		██████	Current NHERI Awards Excluded from NSF's Mid-scale RI-Other Awards List
		██████	Award Was Assigned a Mid-scale RI-1 Program Code but Was Included on the Mid-scale RI-Other Award List
		██████	NSF Mid-Scale-Other Award Amount Was Not Within the Mid-Scale Program Threshold
		██████	NSF Mid-Scale-Other Award Amount Was Not Within the Mid-Scale Program Threshold
		██████	NSF Mid-Scale-Other Award Amount Was Not Within the Mid-Scale Program Threshold
NSF Did Not Always Verify Mid-scale RI Awards Were Proposed and Awarded Consistent with Mid-scale RI Guidance	NSF Awarded a Mid-scale RI-1 Award with a Project Type That Was Not in Accordance with the Mid-scale RI-1 Program Solicitation Guidance	██████	NSF Awarded a Development Project as a Mid-scale RI-1 Award
		██████	
		██████	Budget Contingency Was Not Reviewed Because It Was Proposed as an Other Direct Cost

Observation	Sub-Observation	Award No.	Observations Noted
	NSF Did Not Always Review or Award Budget Contingency in Accordance with NSF Practice		Budget Contingency Was Not Reviewed Because It Was Proposed as an Other Direct Cost
			Budget Contingency Was Not Awarded for Known Expenses
	NSF Did Not Always Document If or How It Verified Awardees Were Eligible to Receive Mid-scale RI Awards		Budget Contingency Was Not Reviewed or Awarded Because the IPT Did Not Think Budget Contingency Was Allowable
			NSF Did Not Support It Verified the Awardee Was Eligible to Receive the Award
			NSF Did Not Support It Verified the Awardee Was Eligible to Receive the Award
			NSF Did Not Support It Verified the Awardee Was Eligible to Receive the Award
			NSF Did Not Support It Verified the Awardee Was Eligible to Receive the Award
NSF Did Not Establish Timely Proposal, Award, Monitoring, and Reporting Guidance	NSF Did Not Consistently Perform the Pre-Award Review Processes Recommended for Mid-scale RI Awards		NSF Did Not Document that the PEP Was Thoroughly Assessed
			NSF Did Not Create the Performance Measurement Baseline Before Recommending the Award
	NSF Did Not Verify Whether External Reviewers Considered All Relevant Merit Review Criteria		Proposal Was Not Evaluated Consistent with Program Solicitation Criteria
			Proposal Was Not Evaluated Consistent with Program Solicitation Criteria
			Proposal Was Not Evaluated Consistent with Program Solicitation Criteria
			Proposal Was Not Evaluated Consistent with Program Solicitation Criteria
			Proposal Was Not Evaluated Consistent with Program Solicitation Criteria
			Proposal Was Not Evaluated Consistent with Program Solicitation Criteria
			Proposal Was Not Evaluated Consistent with Program Solicitation Criteria
			Proposal Was Not Evaluated Consistent with Program Solicitation Criteria
			Proposal Was Not Evaluated Consistent with Program Solicitation Criteria
			Proposal Was Not Evaluated Consistent with Program Solicitation Criteria
	NSF Did Not Develop or Follow Project Award-Specific Management Plans (MPs)		The Project Management Plan Was Created at the Program Solicitation Level
			The Project Management Plan Was Created at the Program Solicitation Level
			The Project Management Plan Was Created at the Program Solicitation Level
			The Project Management Plan Was Created at the Program Solicitation Level
			The Project Management Plan Was Created at the Program Solicitation Level
			The IPT Did Not Follow the Management Plan
			The Project Management Plan Was Created at the Program Solicitation Level
			The Project Management Plan Was Created at the Program Solicitation Level
			The Project Management Plan Was Created at the Program Solicitation Level

Observation	Sub-Observation	Award No.	Observations Noted
		[REDACTED]	The Project Management Plan Was Created at the Program Solicitation Level
			The Project Management Plan Was Created at the Program Solicitation Level
			A Project Management Plan Was Not Created
			A Project Management Plan Was Not Created
	NSF Did Not Consistently Document How it Reviewed Proposal Budgets or Schedules	[REDACTED]	NSF Did Not Document Evaluating Whether Budgets Were Developed Consistent with Relevant Guidance
			Budget Contingency Was Not Reviewed or Evaluated Consistent with Relevant Guidance
		[REDACTED]	NSF Did Not Document Evaluating Whether Budgets Were Developed Consistent with Relevant Guidance
			Budget Contingency Was Not Reviewed or Evaluated Consistent with Relevant Guidance
		[REDACTED]	NSF Did Not Document Evaluating Whether Budgets Were Developed Consistent with Relevant Guidance
			Budget Contingency Was Not Reviewed or Evaluated Consistent with Relevant Guidance
		[REDACTED]	Budget Contingency Was Not Reviewed or Evaluated Consistent with Relevant Guidance
			NSF Did Not Document Evaluating Whether Project Schedules Were Developed Consistent with Relevant Guidance
	NSF Did Not Always Perform—or Document Performance of—FL-99 Reviews/Independent Cost Estimate Reviews (ICERs)	[REDACTED]	NSF Did Not Document Evaluating Whether Project Schedules Were Developed Consistent with Relevant Guidance
			No ICER Was Performed
		[REDACTED]	No ICER Was Performed
			No Memorandum Was Created to Support the Results/Resolutions of the FL-99 Review
	NSF IPT Members Could Not Always Verify That Personnel Performed the Recommended Proposal/Award Activities	[REDACTED]	The FL-99 Report was not Completed before the NSF Grant was Awarded
			No Memorandum Was Created to Support the Results/Resolutions of the FL-99 Review
		[REDACTED]	No Memorandum Was Created to Support the Results/Resolutions of the FL-99 Review
			No Memorandum Was Created to Support the Results/Resolutions of the FL-99 Review
		[REDACTED]	Grants and Agreements Officer (G/AO) Could Not Verify that G/AO Recommended Proposal/Award Activities Were Performed
			Research Infrastructure Office (RIO) Liaison Could Not Verify that RIO Recommended Proposal/Award Activities Were Performed
		[REDACTED]	Cost Analyst (CA) Could Not Verify that CA Recommended Proposal/Award Activities Were Performed
			G/AO Could Not Verify that G/AO Recommended Proposal/Award Activities Were Performed
		[REDACTED]	CA Could Not Verify that CA Recommended Proposal/Award Activities Were Performed
			CA Could Not Verify that CA Recommended Proposal/Award Activities Were Performed

Observation	Sub-Observation	Award No.	Observations Noted
			RIO Liaison Could Not Verify that RIO Recommended Proposal/Award Activities Were Performed
			G/AO Could Not Verify that GO Recommended Proposal/Award Activities Were Performed CA Could Not Verify that CA Recommended Proposal/Award Activities Were Performed RIO Liaison Could Not Verify that RIO Recommended Proposal/Award Activities Were Performed
			G/AO Could Not Verify that G/AO Recommended Proposal/Award Activities Were Performed
			G/AO Could Not Verify that G/AO Recommended Proposal/Award Activities Were Performed
			G/AO Could Not Verify that G/AO Recommended Proposal/Award Activities Were Performed
			G/AO Could Not Verify that G/AO Recommended Proposal/Award Activities Were Performed
			G/AO Could Not Verify that G/AO Recommended Proposal/Award Activities Were Performed CA Could Not Verify that CA Recommended Proposal/Award Activities Were Performed
			G/AO Could Not Verify that G/AO Recommended Proposal/Award Activities Were Performed CA Could Not Verify that CA Recommended Proposal/Award Activities Were Performed
			G/AO Could Not Verify that G/AO Recommended Proposal/Award Activities Were Performed
	NSF IPT Members Did Not Always Complete Recommended Proposal or Award Activities		RIO Liaison Did Not Perform all Recommended RIO Proposal/Award Activities
			The NSF IPT Did Not Perform the Proposal/Award/Monitoring Activities Recommended
NSF Did Not Always Perform Mid-scale RI Award Oversight Activities Required to Ensure Awardees Complied with Relevant Guidance	Awardee Mid-scale RI Proposals Did Not Contain All Recommended Elements		Proposal Did Not Include Actual and Budget Cost Estimates for the Required Project Life Cycles Proposal Did Not Include a Concept of Operations (COO) Discussion or Strategy and Timeline for Divestment
			Proposal Did Not Include Actual and Budget Cost Estimates for the Required Project Life Cycles Proposal Did Not Include a COO Discussion or Strategy and Timeline for Divestment
			Proposal Did Not Include Actual and Budget Cost Estimates for the Required Project Life Cycles Proposal Did Not Include a COO Discussion or Strategy and Timeline for Divestment
			Proposal Did Not Include Actual and Budget Cost Estimates for the Required Project Life Cycles Proposal Did Not Include a COO Discussion or Strategy and Timeline for Divestment
			Proposal Did Not Include Actual and Budget Cost Estimates for the Required Project Life Cycles Proposal Did Not Include a COO Discussion or Strategy and Timeline for Divestment
			Proposal Did Not Include Actual and Budget Cost Estimates for the Required Project Life Cycles Proposal Did Not Include a COO Discussion or Strategy and Timeline for Divestment
			Proposal Did Not Include a COO Discussion or Strategy and Timeline for Divestment
			Proposal Did Not Include Actual and Budget Cost Estimates for the Required Project Life Cycles Proposal Did Not Include a COO Discussion or Strategy and Timeline for Divestment

Observation	Sub-Observation	Award No.	Observations Noted
	Awardee PEPs Did Not Contain All Recommended Elements	██████	The PEP Did Not Include All Recommended Topics and Subtopics The PEP Was Not Sufficiently Detailed
		██████	The PEP Did Not Include All Recommended Topics and Subtopics The PEP Was Not Sufficiently Detailed
		██████	The PEP Did Not Include All Recommended Topics and Subtopics The PEP Was Not Sufficiently Detailed
		██████	The PEP Did Not Include All Recommended Topics and Subtopics The PEP Was Not Sufficiently Detailed
		██████	The PEP Did Not Include All Recommended Topics and Subtopics The PEP Was Not Sufficiently Detailed
		██████	The PEP Did Not Include All Recommended Topics and Subtopics The PEP Was Not Sufficiently Detailed
		██████	The PEP Was Not Sufficiently Detailed
		██████	The PEP Did Not Include All Recommended Topics and Subtopics The PEP Was Not Sufficiently Detailed
		██████	The PEP Did Not Include All Recommended Topics and Subtopics The PEP Was Not Sufficiently Detailed
	Awardees Did Not Consistently Create PEPs	██████	A PEP Was Not Created or Requested
			A PEP Was Not Created or Requested
			An Operations PEP (OPEP) Was Created Rather Than a PEP
	Awardees Did Not Receive Formal PEP Approvals	██████	NSF Did Not Document PEPs were Formally Approved
			NSF Did Not Document PEPs were Formally Approved
			NSF Did Not Document PEPs were Formally Approved
			NSF Did Not Document PEPs were Formally Approved
			NSF Did Not Document PEPs were Formally Approved
			NSF Did Not Document PEPs were Formally Approved
			NSF Did Not Document PEPs were Formally Approved
			NSF Did Not Document PEPs were Formally Approved
	Awardees Did Not Submit Mid-scale RI Annual Reports Before Applicable Due Dates	██████	Annual Reports Were Not Submitted on Time
			Annual Reports Were Not Submitted on Time
			Annual Reports Were Not Submitted on Time
			Annual Reports Were Not Submitted on Time
			Annual Reports Were Not Submitted on Time
			Annual Reports Were Not Submitted on Time

Observation	Sub-Observation	Award No.	Observations Noted
			Annual Reports Were Not Submitted on Time
			Annual Reports Were Not Submitted on Time

*Although these award numbers were not included in our sample, we noted these observations during our audit planning activities.

Source: Auditor summary of identified observations.

APPENDIX D: GLOSSARY

Budget Contingency. A planned amount of budget and time added to the baseline estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and that experience shows will likely result, in aggregate, in additional costs. These events are often referred to as “known-unknowns” and are considered manageable by the Recipient. Budget and schedule contingency are typically estimated using statistical analysis and professional judgment based on experience. Budget contingency is called out separately as part of the Total Project Cost estimate and obligated to the project for the Recipient to manage based on need per NSF policy. (RIG NSF 21-107).

[Return to the term’s initial use.](#)

Budget, Finance and Award Management (BFA). NSF’s BFA supports NSF by providing business, financial and analytical services to diverse stakeholders and customers.

(<https://www.nsf.gov/bfa/>).

[Return to the term’s initial use.](#)

Concept of Operations (COO). The COO plan defines the resources and funding needs when the facility has completed construction and is transitioned to operations and is refined during the Construction Stage in preparation for entering the Operation Stage. (RIG NSF 21-107).

[Return to the term’s initial use.](#)

Contracting Officer (CO). The CO has legal responsibility and authority for the business and financial management of award contracts. (RIG NSF 21-107).

[Return to the term’s initial use.](#)

Cooperative Support Branch (CSB). NSF’s CSB (now NSF’s Infrastructure Support Branch [ISB]) is responsible for planning, solicitation, negotiation, award and administration of cooperative agreements for federally funded research and development centers and major research facilities in various stages of construction and operations, including multi-institutional and international programs. This includes participation and input on NSF project advisory teams, business process reviews and redesign, risk assessments, and administrative assistance. (PAPPG 20-1).

[Return to the term’s initial use.](#)

Cost Analyst (CA). The CA performs cost assurance reviews of proposals and monitors recipient financial practices. (RIG NSF 21-107).

[Return to the term’s initial use.](#)

Design Project. A project within the “Design Stage” of its life cycle stage which includes detailed planning for projects approved by the NSF Director at the end of the Development Stage and are funded under the formal major facility planning process. (RIG NSF 21-107).

[Return to the term’s initial use.](#)

Development Project. A project within the “Development Stage” during which initial high-level ideas are developed and a consensus built for the potential long-term need, priorities, and general requirements for a large research facility of interest to NSF and the broader research community. (RIG NSF 21-107).

[Return to the term’s initial use.](#)

Division of Institution and Award Support (DIAS). NSF’s DIAS is responsible for the development and implementation of proposal and award policies and procedures, clearance of NSF funding opportunities, advanced monitoring activities, cost analysis and award support, audit resolution, electronic award systems administration, and outreach to the external community. (PAPPG 20-1).

[Return to the term’s initial use.](#)

Division of Acquisition and Cooperative Support (DACS). NSF’s DACS provides acquisition and cooperative agreement award support for the Foundation. The Contracts Branch is responsible for planning, solicitation, negotiation, award and administration of professional, administrative, and research support contracts for NSF. The Cooperative Support Branch (CSB) is responsible for planning, solicitation, negotiation, award and administration of cooperative agreements for FFRDCs and major research facilities in various stages of construction and operations, including multi-institutional and international programs. (PAPPG 20-1).

[Return to the term’s initial use.](#)

Division of Grants and Agreements (DGA). NSF’s DGA is responsible for the award and administration of the majority of NSF’s assistance awards. From pre-award through closeout, DGA conducts a variety of business, financial, and administrative reviews to ensure compliance with award terms and conditions and consistency with applicable NSF policies and Federal rules and regulations. (PAPPG 20-1).

[Return to the term’s initial use.](#)

FL-99 Review. A type of pre-award review performed by NSF’s Cost Analysis and Pre-award (CAP) Branch, to evaluate the information provided by an organization seeking a cost-reimbursement award and to present the Grants and Agreements Officers (G/AOs) with advice regarding a potential awardee’s accounting system, financial capability/viability, indirect cost rate, particular budget items, or other specific areas of concern as identified by the requesting G/AO. (NSF BFA 2020-1, *Standard FL-99 Pre-award Reviews*).

[Return to the term’s initial use.](#)

Grants and Agreements Officer (G/AO). The G/AO has legal responsibility and authority for the business and financial management of grants and cooperative agreements. (RIG NSF 21-107).

[Return to the term’s initial use.](#)

Implementation Project. A project within the “Implementation Stage” which can include traditional stand-alone construction or acquisition as well as a degree of final development for infrastructure and equipment projects. (NSF 21-537).

[Return to the term’s initial use.](#)

Integrated Project Team (IPT). A formal coordinating group of representatives from the Science and Technical, Award Management, and Strategic sub-groups within the National Science Foundation. This group provides internal agency assurance and guidance to the Program Officer in the planning, review, and oversight throughout the Design, Construction, and Operations Stages. (RIG NSF 21-107).

[Return to the term’s initial use.](#)

Major Facilities Guide (MFG). NSF’s MFG provides guidance to NSF staff on conducting oversight of major facilities and to recipients in carrying out effective project planning and management. Additionally, it communicates the required policies and procedures as well as pertinent guidance and practices at each stage of a facility’s life cycle. (MFG NSF 19-68).

[Return to the term’s initial use.](#)

Management Plan (MP): A MP is a document that includes key project characteristics, the planned oversight approach, and any extraordinary exceptions or additions to the guidance presented in this section as part of the program solicitation development in accordance with NSF policy. (RIG NSF 21-107)

[Return to the term’s initial use.](#)

Mid-scale RI-1. An NSF program that supports either the design or implementation of unique and compelling RI projects. Mid-scale implementation projects may include any combination of equipment, instrumentation, cyberinfrastructure, broadly used large scale datasets and the personnel needed to successfully commission the project. The total cost of current Mid-scale RI-1 projects range from \$6 million to \$20 million. (NSF 21-505).

[Return to the term’s initial use.](#)

Mid-scale RI-2. An NSF program that emphasizes projects that have strong scientific merit, respond to an identified need of the research community, demonstrate technical and managerial readiness for implementation, include a well-developed plan for student training in the design and implementation of mid-scale research infrastructure, and involve a diverse workforce in mid-scale facility development, and/or associated data management. The total cost of current Mid-scale RI-2 projects range from \$20 million to \$100 million. (NSF 21-537).

[Return to the term’s initial use.](#)

Mid-scale RI-Other. NSF programs that consist of a mixture of awards related to the Mid-scale Innovations Program (MSIP), Unsolicited Proposals, Program Solicitations, and Research and Related Activities (R&RA). (Report [Figure 1](#)).

[Return to the term’s initial use.](#)

Performance Measurement Baseline. The approved cost and schedule plan established at award for accomplishing the scope that can be changed only through formal change control process. (RIG NSF 21-107).

[Return to the term's initial use.](#)

Program Officer (PO). A scientist or engineer having primary oversight responsibility within NSF for all aspects of the project. (RIG NSF 21-107).

[Return to the term's initial use.](#)

Project Execution Plan (PEP). The PEP describes how the project will be executed, monitored, and controlled. (RIG NSF 21-107).

[Return to the term's initial use.](#)

Research Infrastructure (RI). Any combination of facilities, equipment, instrumentation, computational hardware and software, and the necessary supporting human capital. (RIG NSF 21-107).

[Return to the term's initial use.](#)

Research Infrastructure Office (RIO). An office with NSF's BFA that supports the research directorates in the development, implementation, and oversight of Major Facilities and Mid-scale Research Infrastructure Programs. (<https://www.nsf.gov/bfa/lfo/>)

[Return to the term's initial use.](#)

RIO Liaison. The designated project management advisor, who is assigned as project liaison. This individual is the PO's primary resource for assistance with all policy, process, and procedural issues related to the development, implementation, and oversight of major facility projects. (RIG NSF 21-107).

[Return to the term's initial use.](#)

Research Infrastructure Guide (RIG). NSF's RIG provides guidance to NSF staff on conducting oversight of major facilities and to recipients in carrying out effective project planning and management. Additionally, communicates the required policies and procedures as well as pertinent guidance and practices at each stage of a facility's life cycle. (RIG NSF 21-107).

[Return to the term's initial use.](#)

Total Project Cost (TPC). TPC is the sum of the baseline budget (including indirect costs), the budget contingency, fee/profit (as applicable), and management reserve (if authorized) for the Construction Stage. Further, the RIG notes that, when determining whether a cost should be included as a mid-scale project, NSF interprets the TPC as the total the investment in construction, implementation, or acquisition, not the design, operations or associated science program costs. (RIG NSF 21-107).

[Return to the term's initial use.](#)

National Defense Authorization Act

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 November 30, 2024. 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.

About Us

NSF OIG was established in 1989, in compliance with the *Inspector General Act of 1978* (5 USC 401-24). Our mission is to provide independent oversight of NSF to improve the effectiveness, efficiency, and economy of its programs and operations and to prevent and detect fraud, waste, and abuse.

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- Anonymous Hotline: 1-800-428-2189
- Mail: 2415 Eisenhower Avenue, Alexandria, VA 22314 ATTN: OIG HOTLINE

Have a question about reporting fraud, waste, or abuse? Email OIG@nsf.gov.

Whistleblower Retaliation Information

All NSF employees, contractors, subcontractors, awardees, and subawardees are protected from retaliation for making a protected disclosure. If you believe you have been subject to retaliation for protected whistleblowing, or for additional information on whistleblower protections, please visit oig.nsf.gov/whistleblower.