

Audit of NSF's Controls to Prevent Misallocation of Major Facility Expenses

NATIONAL SCIENCE FOUNDATION
OFFICE OF INSPECTOR GENERAL

June 21, 2019
OIG 19-2-006





AT A GLANCE

Audit of NSF's Controls to Prevent Misallocation of Major Facility Expenses

Report No. OIG 19-2-006

June 21, 2019

WHY WE DID THIS AUDIT

We sought to determine if NSF, as part of its oversight of the construction and operations of major facility projects, ensures that recipients allocate their construction and operations expenses to the correct award.

WHAT WE FOUND

NSF funds the construction, management, and operation of major research facilities (major facility), which are shared-use infrastructure accessible to a broad community of researchers and educators. NSF makes separate awards to external recipient entities (recipients) to undertake major facility construction and operations, typically through cooperative agreements. NSF does not directly construct or operate major facilities, but it is responsible for overseeing the recipient's performance of the funded activities.

Although NSF conducted oversight of the construction and operations of major facility projects, it did not provide sufficient guidance to ensure recipients consistently allocated construction and operation expenses to the correct award or adequately documented allocation decisions. As a result, NSF cannot assure that recipients always spent construction and operations funds for authorized purposes. Additionally, NSF's major facility acceptance process does not require NSF to assess and document the impact of moving uncompleted tasks from the construction award to the operations award. Consequently, NSF may not be fully aware of the financial and scientific impact of uncompleted construction tasks on operations. NSF agreed to take corrective actions, including requiring major facility recipients with ongoing construction to create segregation of funding plans. NSF also plans to require a final construction review.

WHAT WE RECOMMEND

We made recommendations to help ensure major facility construction and operations expenses are allocated to the correct award. We also recommended that NSF establish a process for assessing the cost and scientific impact of uncompleted construction tasks and require an independent panel to review construction completion and facility readiness prior to the acceptance of a major facility.

AGENCY RESPONSE

NSF agreed with our recommendations. NSF's response is included in its entirety in Appendix A.

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




NATIONAL SCIENCE FOUNDATION
OFFICE OF INSPECTOR GENERAL

MEMORANDUM

DATE: June 21, 2019

TO: Fleming Crim
Chief Operating Officer

Teresa Grancorvitz
Chief Financial Officer and Head
Office of Budget, Finance, and Award Management

FROM: Mark Bell 
Assistant Inspector General
Office of Audits

SUBJECT: Final Report No. 19-2-006, *Audit of NSF's Controls to Prevent Misallocation of Major Facility Expenses*

Attached is the final report on the subject audit. We have included NSF's response to the draft report as an appendix.

This report contains six recommendations aimed at improving NSF's controls to prevent misallocation of major facility expenses. NSF concurred with all of our recommendations. In accordance with Office of Management and Budget Circular A-50, *Audit Follow-up*, please provide a written corrective action plan to address the report recommendations. In addressing the report's recommendations, this corrective action plan should detail specific actions and associated milestone dates. Please provide the action plan within 60 calendar days of the date of this report.

We appreciate the courtesies and assistance NSF staff provided during the audit. If you have any questions, please contact Elizabeth Kearns, Director, Audit Execution, at (703) 292-7100.

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ABBREVIATIONS

GAO	U.S. Government Accountability Office
LFM	Large Facilities Manual
NSB	National Science Board
OMB	Office of Management and Budget
OOI	Ocean Observatories Initiative
R/V	Research Vessel



Background

The National Science Foundation (NSF) is an independent Federal agency created by Congress in 1950 “to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense....” As part of its mission, NSF funds the construction, management, and operation of major multi-user research facilities (major facility), which are shared-use infrastructure accessible to a broad community of researchers and educators. NSF’s major facilities typically have construction costs greater than \$70 million, with total construction costs ranging from one hundred to several hundred million dollars over a multi-year period. Once construction is complete, NSF facilities may operate for 20-40 years with annual operations and maintenance budgets ranging between 6 and 10 percent of the original construction cost.

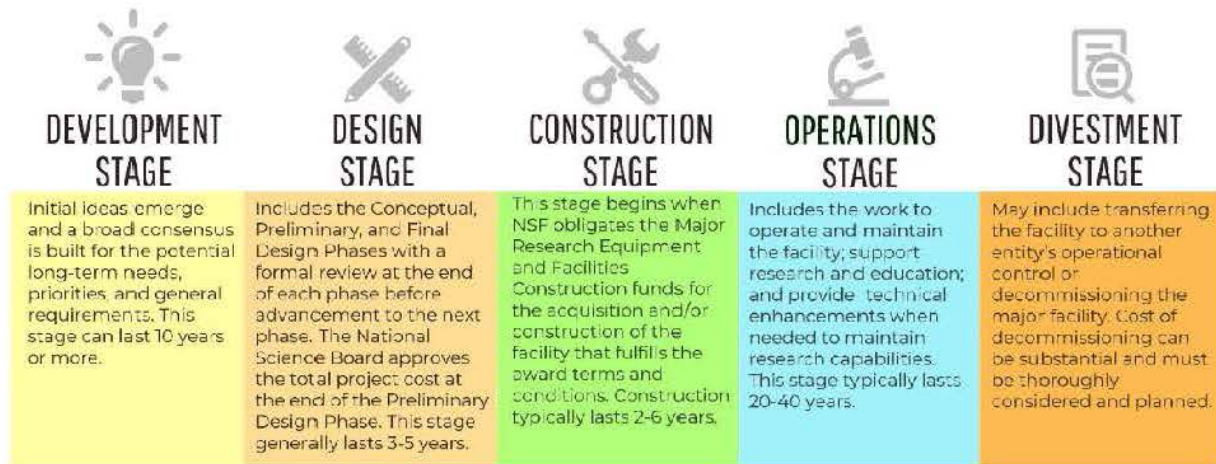
NSF makes awards to external recipient entities (recipients) to undertake major facility design, development, construction, operations, and maintenance, typically through cooperative agreements, a type of Federal award. NSF awards for major facility construction and operations are primarily funded from two NSF appropriations accounts: the Major Research Equipment and Facility Construction (construction) account and the Research and Related Activities (operations) account. Congress approved the creation of the construction account in 1995 to provide a special account specifically for the acquisition, construction, and commissioning of major facilities. The account is intended to prevent large periodic obligations from distorting NSF budgets and ensures the availability of resources to complete large multi-year projects. The construction account funding is specifically for the construction stage and cannot be used to support other activities. NSF uses its operations account to support major facility planning, development, design, operations, and scientific research.

Although NSF does not directly construct or operate major facilities, it is responsible for overseeing the recipient’s performance of the funded activities. This includes monitoring whether recipients correctly allocate construction expenses to the construction award and operational expenses to the operations award. NSF’s Large Facilities Office maintains the *Large Facilities Manual* (LFM), which contains policies for NSF staff and recipients¹ on the planning, management, and oversight of major facilities. The LFM includes required deliverables, reviews, and approvals needed for entry and exit from each stage of the facility’s lifecycle; see Figure 1.

¹ The 2017 LFM replaced the term “awardee” with the term “recipient.”



Figure 1. Major Facility Lifecycle Stages



Source: NSF OIG-generated depiction of NSF major facility life cycle

The LFM notes that major facilities rarely have a clean break from construction to operations. Many major facility projects require a commissioning phase to transition to operations, which may result in many years of overlap between construction and operations funding; see Figure 2.

Figure 2. Construction and Operations Stage and Award Overlap



Source: NSF OIG-generated depiction of information adapted from the *Large Facilities Manual*, 2017

As part of its major facility oversight responsibilities, NSF conducts periodic and annual reviews at various stages of construction and operations, as well as assessments such as pre-award reviews and business systems reviews. For example, NSF’s Cost Analysis and Pre-Award Branch² performs financial and pre-award reviews to evaluate the information provided by the recipient and to advise the Grants and Agreement Officers regarding budgets, award terms and conditions, or other concerns. Additionally, NSF’s Large Facilities Office conducts business systems reviews to ensure that the major facility recipient business systems effectively meet administrative responsibilities and Federal requirements.

² Previously called the Cost Analysis and Audit Resolution Branch



As of March 2019, NSF had 23 major facilities including telescopes, research ships, and an ecological monitoring network. We reviewed two major facilities for this audit: the Ocean Observatories Initiative (OOI) and the research vessel (R/V) *Sikuliaq*. OOI is an ocean research observatory that includes the world's largest network of ocean and seafloor sensors. The recipient for OOI, the Consortium for Ocean Leadership,³ began construction in 2009 and completed the facility in 2016 for approximately \$385 million. OOI began initial operations in 2010 and has spent approximately \$275.7 million on operations as of April 2019.

The R/V *Sikuliaq* is a 261-foot oceanographic research ship, capable of breaking ice up to 2.5 feet thick. The ship's construction began in 2009 and cost approximately \$199 million. R/V *Sikuliaq* began operations in 2014, and the recipient has spent approximately \$20.9 million of the operations award as of April 2019.

Figure 3. Example of OOI Infrastructure and Photograph of R/V *Sikuliaq*

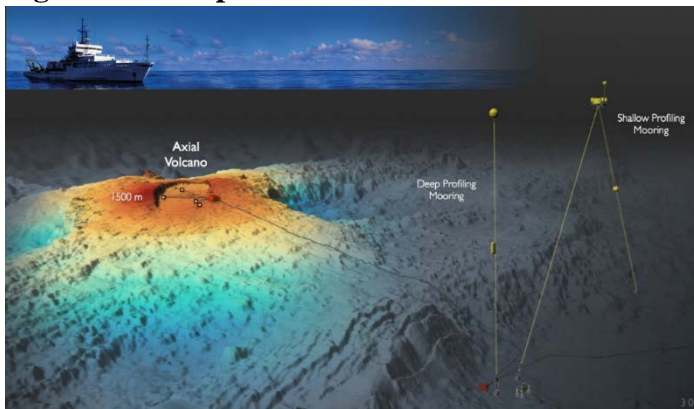


Image courtesy of the University of Washington/Center for Environmental Visualization, OOI, and NSF.

R/V Sikuliaq - photograph courtesy of Kim Kenny.

The objective of this audit was to determine whether NSF, as part of its oversight of the construction and operations of major facility projects, ensures that recipients allocate their construction and operations expenses to the correct award.

Results of Audit

Although NSF conducted oversight of the construction and operations of major facility projects, it did not provide sufficient guidance to ensure recipients consistently allocated construction and operation expenses to the correct award or adequately documented allocation decisions. As a result, NSF cannot assure that recipients always spent construction and operations funds for authorized purposes. Additionally, NSF's major facility acceptance process does not require NSF to assess and document the

³ The OOI recipient in this report refers to the Consortium for Ocean Leadership. In September 2018, NSF awarded a new cooperative agreement to Woods Hole Oceanographic Institution for operating OOI and approved funding up to \$220 million for a five-year period.



impact of moving uncompleted tasks from the construction award to the operations award. Consequently, NSF may not be fully aware of the financial and scientific impact of uncompleted construction tasks on operations.

NSF Did Not Provide Sufficient Allocation Guidance to Recipients

NSF did not provide sufficient allocation guidance to major facility award recipients, either through the award terms or the LFM, to ensure they allocated major facility construction and operations expenses to the correct awards. For example, in its award terms, NSF outlined recipient and NSF responsibilities but did not provide clear requirements or guidance for allocating construction and operations expenses. In addition, NSF did not assess whether recipient policies and procedures addressed how to allocate costs between the awards. In the two projects we examined, the recipient's policies and procedures did not address how to ensure correct allocation of expenses between construction and operations awards or how to maintain adequate documentation to support allocation decisions. Without such guidance, recipients may not fully understand how to allocate expenses to the correct award, and this could result in misallocation.

Misallocated or Insufficiently Supported Construction and Operations Expenses

We found that OOI and R/V *Sikuliaq* recipients misallocated or insufficiently supported construction and operations expenses. The construction and operations awards for both the OOI and R/V *Sikuliaq* overlapped and included similar or identical planned work — creating an inherent risk that the recipients could misallocate expenses. From 2010 through 2016, OOI's construction and operations awards overlapped and the recipient incurred costs related to travel, salary, and equipment, which supported both construction and operations activities. R/V *Sikuliaq*'s awards overlapped from August 2014 to March 2016 and the recipient incurred similar expenses, such as salary, travel, fuel, oil, and food, to support construction and operations activities.

The OOI and R/V *Sikuliaq* construction award terms required the recipients to use award funds solely for the work identified in the construction award and to comply with applicable Federal cost principles, which require that expenses be allowable, reasonable and allocable.⁴ We requested all of OOI's and R/V *Sikuliaq*'s construction and operations expenses and selected a judgmental sample of transactions that could have been allocated to the wrong award. (See Appendix B for our methodology.) We reviewed supporting documentation for expenses in our sample to identify if the costs were correctly allocated to the construction or operations award. We also used other information, such as the R/V *Sikuliaq*'s cruise status, to determine allocability. Based on information we reviewed, we identified various types of expenses that were misallocated or insufficiently supported by documentation for both OOI and R/V *Sikuliaq*.

⁴The awards were subject to Office of Management and Budget's (OMB) circulars A-21 and A-122. Specifically, 2 Code of Federal Regulations (CFR) Part 230, *Cost Principles for Nonprofit Organizations* (OMB Circular A-122) applied to OOI; and 2 CFR Part 220, *Cost Principles for Educational Institutions* (OMB Circular A-21) applied to R/V *Sikuliaq*. In 2014, 2 CFR Part 200, *Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards* (Uniform Guidance) superseded guidance from earlier OMB circulars.



Misallocated Expenses

Federal cost principles require that award costs be allocated (charged or assigned) to an award in accordance with the relative benefits received.⁵ During our review, we identified expenses charged to the wrong award. For example:

- In 2014, the OOI recipient's program management office charged all its salary and travel expenses to the OOI construction award even though it was also performing work related to operations.
- Salary expenses for two R/V *Sikuliaq* crew members were charged to the construction award even though the pay periods fell during operations cruises.
- During an operational period, the R/V *Sikuliaq* recipient rented a crane to lift gear onto the vessel but charged the rental fee to the construction award.

Additionally, for costs to be allocable or allowable under an award, costs incurred for the same purpose in like circumstances must be treated consistently.⁶ For example, we would expect to see employees' travel expenses charged to the same award as their salary for the duration of a trip; or, if the trip benefited both the construction and operations awards, we would expect to see the travel and salary expenses charged to the two awards in the same proportion. However, the recipient for OOI did not always ensure travel and salary expenses were consistently allocated during the 6-year overlap of the construction and operations awards. For instance:

- An OOI employee's airline ticket was charged to the construction award although the salary for the 3 days the employee was on travel was charged to the operations award.
- Another employee's salary during a conference was charged to the operations award although the travel related to the conference was charged to the construction award.
- A different employee's travel expenses for a 10-day trip were charged to the construction award although his salary during the trip was divided between the construction and operations awards.

Similarly, the R/V *Sikuliaq* recipient did not consistently allocate expenses during the 20-month overlap of the construction and operations awards. Between November 2014 and March 2016, R/V *Sikuliaq* alternated between periods of construction — during which the recipient completed construction tasks and tested the ship — and operations cruises — during which the recipient conducted science-based activities. During this time, the recipient incurred expenses such as fuel, oil, and food to support both construction and operations activities. The recipient did not have a written process for allocating expenses when alternating between construction and operations activities. When asked how they knew to appropriately allocate these expenses, recipient staff told us they charged costs such as fuel, oil, and

⁵ 2 CFR Part 230, Appendix A, Section A.4; 2 CFR 220, Appendix A, C.4; Also, per Uniform Guidance, "A cost is allocable to a particular Federal award or other cost objective if the goods or services involved are chargeable or assignable to that Federal award or cost objective in accordance with relative benefits received."

⁶ 2 CFR Part 230 states, "A cost is allocable to a Federal award if it is treated consistently with other costs incurred for the same purpose in like circumstances." 2 CFR Part 220 states, "The tests of allowability of costs under these principles are...: they must be given consistent treatment through application of those generally accepted accounting principles appropriate to the circumstances..." Additionally, the Uniform Guidance states, "Except where otherwise authorized by statute, costs must meet the following general criteria in order to be allowable under Federal awards...(d) Be accorded consistent treatment."



food retrospectively to replace what had been consumed on the previous cruise. However, we analyzed the R/V *Sikuliaq*'s expenses and found that for 10 months of the 20-month overlap, the recipient did not consistently use this method to allocate such expenses.

Insufficiently Documented Expenses

For other transactions, we could not determine whether expenses were charged to the correct award because the recipients' supporting documentation did not always include sufficient descriptions of the activity and its purpose. For example, we reviewed the OOI recipient's travel expenses for conferences, meetings, and site-visits. Although the supporting documentation for these travel expenses included the name of the conference, meeting, or location of the site-visit, the description was insufficient to determine whether the expenses benefited the award charged.

In addition, the recipients did not always demonstrate how a cost benefited both awards when dividing expenses.⁷ Because the construction and operations award periods overlapped, the recipients incurred costs that may have benefited both the construction and operations awards in some cases. However, the recipients' supporting documentation did not always demonstrate how the expense benefited both awards or how they determined the proportion of the expense that should be charged to each award. For example, the R/V *Sikuliaq* recipient divided travel expenses for an employee between the construction and operations awards without documenting how the employee's travel benefited both awards. In another example, the recipient incurred \$328,787 in professional services expenses during a construction period; however, the recipient charged \$255,420 of this amount to the construction award and \$73,367 to the operations award without documenting why it considered this portion to be operations related. Similarly, the OOI recipient divided office equipment and employee travel between the construction and operations awards in varying proportions without explaining how they determined the proportions.

We also found that recipients did not always document reasons for cost transfers as required by their internal policies. A cost transfer is the reallocation of a previously assigned cost onto, off of, or between awards. Both recipients required cost transfer forms but did not always include such forms with their supporting documentation. Additionally, some cost transfer forms had insufficient justification. For example, the following transfers were made without sufficient documentation:

- \$9,172 in OOI travel expenses transferred from the construction award to the operations award.
- \$17,582 in legal expenses for OOI transferred from the construction award to the operations award.
- \$331,155 in salary for the R/V *Sikuliaq* transferred from the construction award to the operations award.
- \$1,316 in car rental fees for the R/V *Sikuliaq* crew during a dry-dock construction period transferred from the construction award to the operations award.

⁷ 2 CFR Part 220, Appendix A, C.4.d (3); 2 CFR Part 230, Appendix B, 1e; Additionally, per Uniform Guidance, "If a cost benefits two or more projects or activities in proportions that cannot be determined because of the interrelationship of the work involved, then, notwithstanding paragraph (c) of this section, the costs may be allocated or transferred to benefitted projects on any reasonable documented basis."



NSF Oversight

According to the LFM, the NSF program officer⁸ in the division, directorate, or office that proposed the major facility has primary oversight responsibility within NSF for all aspects of the project. Additionally, the NSF grants and agreements officer has legal responsibility and authority for the business and financial management of the cooperative agreement. NSF's Large Facility Office conducts business systems reviews to monitor recipients' stewardship of the award funds and help the recipients implement and maintain compliant business systems to support the major facility. The Large Facility Office assembles and coordinates a team of experts to assess the recipient's policies, procedures, and practices to determine whether its administrative business systems meet NSF award expectations and comply with Federal regulations.

NSF conducted business systems reviews for OOI and R/V *Sikuliaq*. As part of the reviews, NSF assessed the recipients' business systems and policies and procedures related to general management, award management, and financial management. The reviews included testing of a judgmental sample of expenses to determine whether they were allowable, allocable, and reasonable; treated consistently; in compliance with recipient policies; incurred within the award period; and supported by documentation. NSF's expense testing did not identify issues with recipients allocating expenses to the wrong award. However, based on our review, the recipients' documentation did not always include justifications or explanations to support their allocation decisions for major facility expenses. Further, recipient policies and procedures did not address how to ensure correct allocation of expenses between construction and operations awards or how to maintain adequate documentation to support allocation decisions. Although the recipients' accounting departments reviewed expenses, staff told us they did not question allocation decisions.

NSF did not require recipients to have a planning document or policy that specifically addressed how they would ensure construction and operations expenses would be allocated to the correct award. According to recipient staff, the principal investigators were primarily responsible for deciding whether to allocate expenses to the construction or operations award. NSF award terms state the recipient is responsible for ensuring that the principal investigator receives a copy of the award conditions; however, the terms did not require principal investigators to receive training on award requirements, such as Federal cost principles. According to the U.S. Government Accountability Office's (GAO) *Standards for Internal Control in the Federal Government* (GAO-14-704G, September 2014), individuals obtain relevant knowledge and skills to carry out their assigned responsibilities largely through professional experience, training, and certifications.

None of the recipients' numerous planning documents we reviewed specifically addressed how they were to ensure construction and operations expenses were allocated to the correct award. However, during our site visit to the R/V *Sikuliaq* recipient, staff created a useful flow chart to depict how the principal investigator decided whether to charge an expense to the construction or operations award. An R/V *Sikuliaq* employee suggested, and we agree, that this flowchart could be incorporated into the

⁸ May also have title of program manager or program director.



recipient's *Project Execution Plan* (the recipient's detailed management plan for design and construction) to help staff make allocation decisions.

NSF is taking steps to strengthen its allocation guidance for allocating construction and operations expenses. For example, in its December 2018 draft *Major Facilities Guide*,⁹ which has been released for public comment, NSF requires major facility award recipients with ongoing construction to create segregation of funding plans for expensing activities between construction and operations funds. We believe NSF could further strengthen its oversight by assessing recipients' controls to ensure expenses are allocated to the correct award during construction and operations award overlap. Such an assessment could be incorporated into already established NSF oversight activities, such as the business systems reviews.

Major Facility Acceptance Process Does Not Address Uncompleted Tasks

NSF's process for transitioning major facility projects from construction to operations does not address how NSF should assess uncompleted construction tasks prior to facility acceptance. Consequently, NSF may not be fully aware of the financial and scientific impact of moving remaining tasks that previously had been part of the construction stage to the operations stage. Additionally, NSF does not require an independent assessment of a major facility's construction completion, although it requires panel reviews for other key decision points. Such a review could provide NSF with an independent assessment of facility readiness as well as the financial and scientific impact of uncompleted construction tasks.

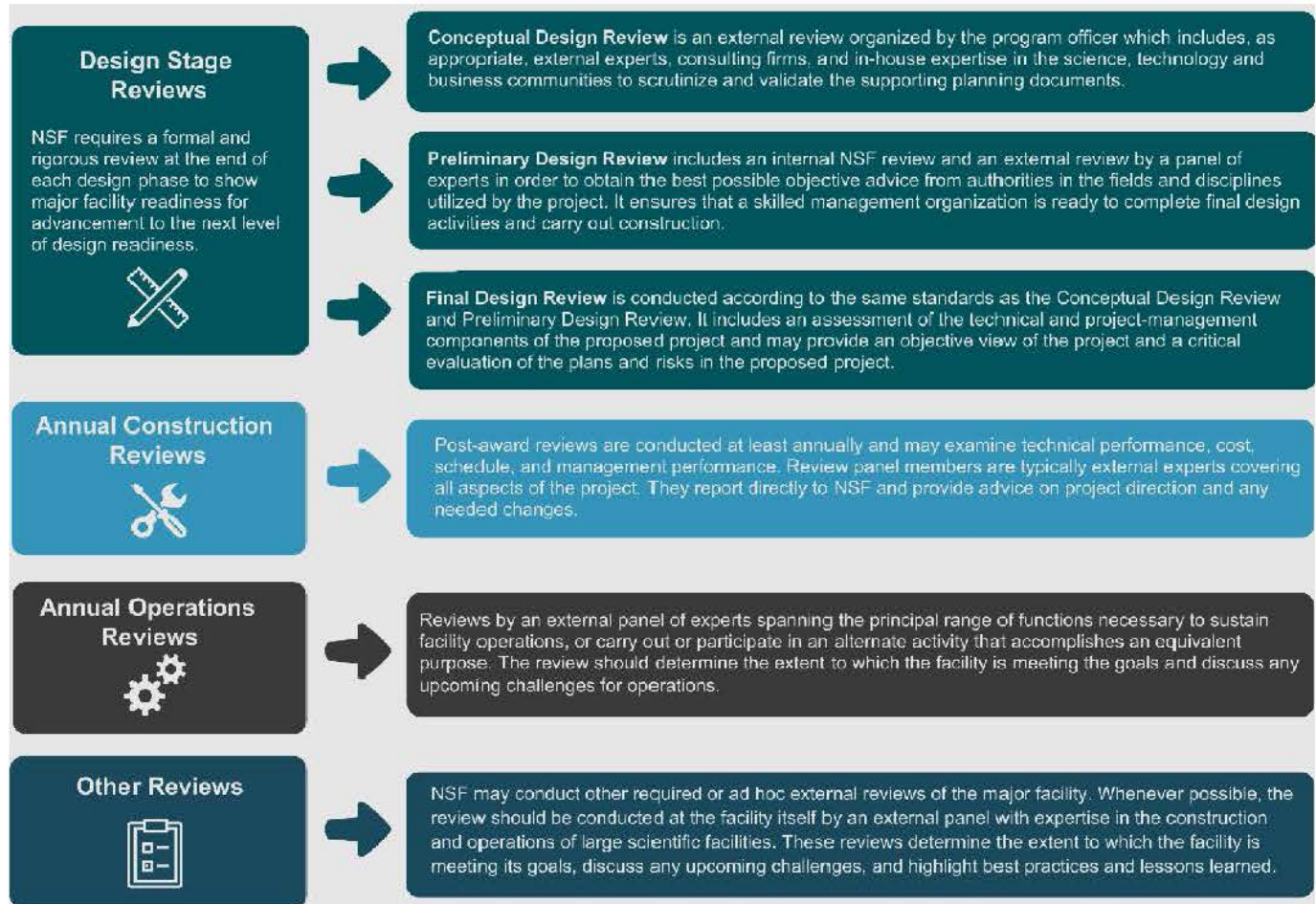
Independent Assessments

NSF requires independent and external panel reviews at key decision points of the major facility design phase and as part of ongoing oversight. NSF assembles external experts to assess the major facility's performance for annual construction reviews, annual operations reviews, and any additional ad hoc external reviews; see Figure 4. However, NSF does not require an independent assessment at the completion of construction to determine whether the major facility should be accepted.

⁹ NSF replaced the original title of this document, "Large Facilities Manual," with the new title "Major Facilities Guide."



Figure 4. NSF Required Reviews



Source: NSF OIG-generated depiction of information adapted from the *Large Facilities Manual*, 2017

Major Facility Acceptance Process

Many major facility projects require a testing phase and commissioning¹⁰ phase during construction to transition the facility to full operations. Additionally, the major facility must meet specific conditions for acceptance before it can be “accepted” and declared ready for operations. According to the LFM, the NSF program officer approves the recipient’s plans for commissioning, testing, and accepting a major facility. These plans specify the expected condition of the facility before it can be accepted.¹¹ Although

¹⁰ Per the LFM, “commissioning” means substantiating the capability of the facility to function as designed by bringing various system components on line first sequentially and then in simultaneous operations to study and affirm the interaction among subsystems.

¹¹ According to the LFM, the program officer, in consultation with the Integrated Project Team, will determine whether the recipient will conduct the tests and accept the facility or whether the program officer will participate in the testing and accept the facility on behalf of the Government.



initial operations may overlap with construction, the major facility construction stage ends after final delivery and acceptance of the defined scope of work and facility performance per the terms of the award agreement.

NSF's process for transitioning major facility projects from construction to operations does not require NSF to assess and document the financial and scientific impact of moving uncompleted tasks from the construction award to the operations award prior to facility acceptance. For example, NSF accepted the OOI facility without assessing the cost and scientific impact of uncompleted construction tasks. Although the OOI recipient listed the operational impact of unfinished construction tasks in its *Construction Final Report*,¹² NSF did not require the recipient to include the costs of those tasks. The recipient described the unfinished construction tasks, such as cyberinfrastructure, as having minimal or no impact on the facility's capabilities and funded the completion of some of these tasks with the OOI operations award. As part of accepting the OOI facility, according to the OOI *Construction Final Report*, NSF agreed that these construction tasks could be considered as enhancements or improvements to the required construction deliverables.

However, the remaining tasks may have had a significant cost and scientific impact on the project. Furthermore, without quantifying the cost and scientific impact of the remaining tasks, NSF does not know if the remaining tasks met the threshold for requesting the National Science Board's (NSB) approval to increase the total project cost for construction. The LFM addresses how recipients and NSF may offset potential cost increases in the major facility construction stage, as a normal part of project management or with NSF approval. NSB approval is required for increasing the total project cost more than 20 percent or \$10 million, whichever is smaller. (The LFM addresses how recipients and NSF may offset potential cost increases in the major facility construction stage; see appendix C.)

Feedback from an external review panel during the acceptance process could provide NSF with an independent assessment of facility readiness, as well as the financial and scientific impact of uncompleted construction tasks. Additionally, an external panel could verify that the major facility met the criteria established in the *Project Execution Plan* to measure acceptable performance and that it meets all the conditions for acceptance before accepting the facility and declaring it ready for operations. By not requiring an independent panel to review a major facility's construction completion, NSF misses the opportunity to obtain an objective assessment of whether the recipient delivered the intended scope. Without a mechanism for assessing and documenting the impact of uncompleted construction tasks on project cost and scope, NSF risks not following its requirements for facility acceptance or determining whether the uncompleted tasks constitute a reduction in scope.

According to GAO's draft *Technology Readiness Assessment Guide: Best Practices for Evaluating the Readiness of Technology for Use in Acquisition Programs and Projects* (GAO-16-410G, August 2016), few Federal agencies have guides for assessing technology readiness for complex acquisitions, including facilities, and the Federal Government has not adopted a generally accepted approach for such evaluations. GAO's guide addresses this issue and highlights the use of independent teams to assess the

¹² Version 1-04, September 21, 2016



readiness of a facility to move past key decision points and provide an evidence-based evaluation of a project's maturity as a best practice.

NSF has taken steps to strengthen oversight over major facility construction. In response to a June 2018 GAO report on NSF major facilities cost and schedule estimates,¹³ NSF is developing a new policy to more fully use panel reviews to address elements of cost and schedule. In addition, this policy would address our recommendation for an independent panel to review construction completion. Specifically, the new policy would require NSF to conduct a final construction review to assess the extent to which the required scope was delivered in accordance with the *Project Execution Plan* and award terms and conditions.

Recommendations

We recommend the NSF Director:

1. Provide guidance to major facility award recipients on how to allocate expenses correctly during the construction and operations phases.
2. Strengthen NSF oversight activities, such as the business systems review, to ensure major facility award recipients are allocating expenses correctly during the construction and operations phases.
3. Prior to the start of operations, require major facility award recipients to submit allocation plans for NSF approval that explain how they will allocate expenses during overlapping construction and operations stages.
4. Require major facility award recipients to develop policies and procedures for allocating expenses benefitting two or more awards in accordance with the Uniform Guidance.
5. Establish a process for assessing and documenting the cost and scientific impact of uncompleted construction tasks and NSF's approval for moving such tasks to operations.
6. Require an independent panel to review construction completion and facility readiness prior to the acceptance of a major facility.

OIG Evaluation of Agency Response

NSF agreed with our recommendations. NSF's response is included in its entirety in Appendix A.

¹³ GAO-18-370, *National Science Foundation: Revised Policies on Developing Costs and Schedules Could Improve Estimates for Large Facilities*, June 1, 2018



Appendix A: Agency Response



National Science Foundation
Office of the Director

MEMORANDUM

Date: JUN 18 2019

To: Mark Bell, Assistant Inspector General, Office of Audits

From: F. Fleming Crim, Chief Operating Officer, NSF
Teresa Grancorvitz, Chief Financial Officer and Head, BFA

Subject: NSF Response to the OIG's Official Draft Report for its *Audit of NSF's Controls to Prevent Misallocation of Major Facility Expenses*

NSF appreciates the opportunity to review and respond to the OIG's Official Draft Report for its *Audit of NSF's Controls to Prevent Misallocation of Major Facility Expenses*. NSF considers its stewardship over Federal funds a high priority. Our Recipient's responsibility for proper segregation of funds is an important issue, and NSF welcomes the report's findings to further strengthen the practices currently in place.

To that end, NSF agrees with the OIG's six recommendations. The Agency's plans include:

1. A requirement in the new *Major Facilities Guide* for a Segregation of Funding Plan as part of the Project Execution Plan (PEP), which is subject to NSF review, for major facilities during the Construction Stage. These Plans are intended to establish a mutual understanding of the Recipient's practices in determining the appropriate award when allocating costs.
2. The annual Major Facilities Portfolio Risk Assessment determines how BFA's oversight and audit activities are synchronized. If proper allocation of funds were to be identified as a risk, the Business Systems Review process could be used to assess the extent to which the Segregation of Funding Plans have been implemented by the Recipient. Verifying the proper allocation of costs is done through incurred cost audits, either based on an identified risk or within three years of the end of a Construction Stage award.
3. Language will be included in the new *Major Facilities Guide* that will go into effect in 2019, describing the intent of the final Construction Stage review in determining whether the required project scope was delivered in accordance with the PEP.



On behalf of the NSF staff participating in the engagement, we further acknowledge the OIG's diligence and commitment to understanding NSF's oversight processes. We look forward to receiving the final report. If you have any concerns, please contact Teresa Grancorvitz at tgrancor@nsf.gov or (703) 292-4435.

cc: France Córdova, Director, NSF
Diane Souvaine, Chair, NSB
Anneila Sargent, Chair, Committee on Oversight NSB



Appendix B: Objective, Scope, and Methodology

The objective of this performance audit was to determine whether NSF, as part of its oversight of the construction and operations of major facility projects, ensures that recipients¹⁴ allocate their construction and operations expenses to the correct award.

To achieve our audit objective, we identified and reviewed applicable Federal laws and regulations related to appropriations of funds, award management, and cost principles. We obtained an understanding of NSF's internal controls over major facilities through interviews with NSF staff and review of NSF policies and procedures relating to award management and oversight as well as major facilities. We interviewed program officers, grants and agreements officers, the Large Facilities Office staff, and other NSF staff responsible for major facility oversight.

To determine if NSF's internal controls ensure recipients allocated expenses to the correct awards, we selected major facilities with both construction and operations awards for our review. We identified three major facilities that had both construction and operations awards in 2016: National Ecological Observatory Network, the Ocean Observatories Initiative (OOI), and the research vessel (R/V) *Sikuliaq*. Although we initially planned to review all three major facilities, we limited our review to OOI and R/V *Sikuliaq* after NSF started to take corrective action based on our findings from these two facilities.

We visited the OOI recipient, the Consortium for Ocean Leadership, in Washington, D.C., and the R/V *Sikuliaq* recipient, the University of Alaska Fairbanks, in Fairbanks and Seward, Alaska. During our site visits, we conducted interviews with recipient staff overseeing the major facilities, such as principal investigators and staff responsible for financial and program management. In addition, we assessed recipient internal controls by reviewing their organizational charts, position descriptions, and relevant policies and procedures. We reviewed award documentation for the OOI and R/V *Sikuliaq* construction and operations cooperative agreements. Additionally, we reviewed project plans, reviews, reports, and recipient audits, as well as correspondence between NSF staff and the recipient.

For our data analysis, the recipients provided accounting data for their construction and operations awards. For this audit, we relied on the data available from NSF databases. The independent auditors' report on NSF's financial statements for fiscal years 2014 and 2015 found no reportable instances in which NSF's financial management systems did not substantially comply with applicable requirements. We reconciled the recipient accounting data for their construction and operations awards against the award information in the NSF financial systems to confirm the accuracy of the recipient data and determine if it was sufficiently reliable and complete for our data analytics process.

We conducted data mining and data analytics on the entire universe of transactions to create a judgmental sample of OOI and R/V *Sikuliaq* construction and operations expenses to review. These transactions were selected for our sample to identify potential misallocation based on criteria, including: expenses divided between multiple awards; cost transfers between construction and operations awards (or vice versa); salary and travel for multiple employees on the same trip charged to different awards;

¹⁴ As previously noted, the 2017 LFM replaced the term "awardee" with the term "recipient."



corresponding employee salary and travel charged to different awards; possible duplicative expenses; and unusual expenses. We reviewed the judgmental sample of OOI and R/V *Sikuliaq* construction and operations expenses to determine if they were allocated to the correct award.

The audit universe for OOI was \$554,248,629.15 and included 61,548 transactions as of February 24, 2017. For OOI, we judgmentally selected a sample of 149 transactions for testing, totaling \$2,158,188.51. The audit universe for R/V *Sikuliaq* was \$225,315,808.22 and included 78,256 transactions as of April 7, 2017. For R/V *Sikuliaq*, we judgmentally selected a sample of 101 transactions for testing, totaling \$1,586,338.15. Additionally, we conducted a cluster analysis, a technique for grouping similar data, for 617 transactions totaling \$331,154.96. Specifically, we conducted a cluster analysis to identify salary transactions from November 1, 2015, through December 31, 2015, transferred from the construction award to the operations award because the recipient indicated all salary expenses were transferred for this time period.

We conducted this performance audit between December 2016 and April 2019 in accordance with *Inspector General Act of 1978*, as amended, and Generally Accepted Government Auditing Standards. 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 upon our audit objectives.



Appendix C: NSF’s Options for Offsetting Cost Increases for Major Facility Construction

The LFM addresses how recipients and NSF offset potential cost increases in the major facility construction stage. The recipient can exercise some of the options for offsetting cost increases throughout construction as a normal part of project management. Other options require NSF approval, such as re-baselining or use of contingency above a predetermined threshold. NSB approval is required for increasing the total project cost more than 20 percent or \$10 million, whichever is smaller.

Additionally, NSF has some flexibility to address cost growth by reprogramming funds within an appropriation and/or by transferring funds between appropriations. Transfer authority must be explicitly authorized by law. NSF’s annual appropriations from FY 2012 through FY 2017 gave the agency such authority and contained certain monetary and other limitations on NSF’s ability to transfer or reprogram funds.¹⁵ Under these appropriations acts, advance congressional notification is required if a transfer or reprogramming of funds “augments existing programs, projects or activities in excess of \$500,000 or 10 percent, whichever is less.” See Figure 5.

Figure 5. Options for Addressing Major Facility Construction Cost Increases



Source: NSF OIG-generated depiction of information from the 2017 LFM and GAO-06-382SP, *Principles of Federal Appropriations Law*, 3rd ed., 2006

¹⁵ We note that transfer authority is dependent on continued inclusion in an NSF appropriation act.



Appendix D: OIG Staff Acknowledgments

Elizabeth Kearns, Director, Audit Execution; Melissa Woolson Prunchak, Audit Manager; Wendell Reid, Audit Manager; Philip Emswiler, Senior Management Analyst; Brittany Moon, Senior Auditor; Elizabeth Argeris Lewis, Communications Analyst; and Keith Nackerud, Independent Report Referencer, made key contributions to this report.



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