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Written Testimony of Cynthia Heckmann

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Subcommittee on Research and Technology

U. S. House of Representatives

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Chairman Comstock, Ranking Member Lipinski, and Members of the Subcommittee:

Thank you for the invitation to testify today to discuss recommendations from the National Academy of Public Administration's (the Academy's) report on the National Science Foundation's use of cooperative agreements (CAs) to support the development, construction, and operations of state-of-the-art large scale, multi-user research facilities.

Established in 1967 and chartered by Congress, the Academy is an independent, non-profit, and non-partisan organization dedicated to helping leaders address today's most critical and complex challenges. The Academy has a strong organizational assessment capacity; a thorough grasp of cutting-edge needs and solutions across the federal government; and unmatched independence, credibility, and expertise. Our organization consists of more than 800 Fellows—including former cabinet officers, Members of Congress, governors, mayors, and state legislators, as well as distinguished scholars, business executives, and public administrators. The Academy has a proven record of improving the quality, performance, and accountability of government at all levels.

Before summarizing the Academy Panel's findings and recommendations, I would like to note that the National Science Foundation (NSF) and National Science Board (NSB) provided the Panel and study team with all of the background materials necessary to complete a thorough and timely review. Interviewees were candid, cooperative, and eager to be of assistance.

Scope

The NSF Director and NSB jointly requested that the Academy conduct a review of NSF's use of cooperative agreements to support the development, construction, and operations of state-of-the-art large scale, multi-user research facilities. The Academy Panel and study team were asked to focus the review on the agency's largest CAs of \$100 million or more involving major research facility construction projects under the Major Research Equipment and Facilities Construction (MREFC) account.

The NSF Director and the National Science Board asked the Academy to review a number of issues related to findings in audits by the NSF Office of Inspector General (OIG), including NSF's cost surveillance approaches under CAs and the agency's oversight of contingency and management fee. Additional key considerations for the Academy's study came from recent congressional hearings and language removed from an earlier version of the America COMPETES Act of 2015 that would have codified a number of OIG recommendations. In reviewing the policies and practices covering the life cycle of large facility construction projects, specific study objectives were to:

- Assess how CAs are currently used at NSF examining the effectiveness of NSF's current CA policy including: (1) the legal and regulatory framework for CAs and when CAs are appropriate; (2) NSF's CA policies, procedures and practices in light of solicitation,

administration, oversight, and auditability and adequacy of accessibility to awardee records and documentation; and (3) contingency and management fee policies and practices.

- Compare cooperative agreements with other federal funding mechanisms.
- Ascertain how comparator scientific agencies manage similarly large, complex research facilities projects.
- Identify potential improvements to NSF's processes that support large-scale research facilities.

Methodology

The Academy assembled an expert Panel comprising five Fellows and one panel member recommended by the Foundation, with broad federal, executive leadership, and academic experience and knowledge in financial management, acquisition management, risk management, project management, accountability mechanisms and scientific inquiry, as well as experience or familiarity with the National Science Foundation and other federal science agencies that promote research. The Academy Panel provided ongoing guidance to a study team of six who carried out the review based on a structured methodology.

The study team performed extensive research in the form of both primary and secondary data collection and analysis. Specifically, the Academy study team examined NSF's use of cooperative agreements, reviewing relevant statutes, regulations and any pending legislation; Inspector General reports addressing CAs; previous internal and external studies on large facilities construction projects; and NSF internal and external guidance on CAs and other procurement and organizational documents/materials including NSF standard operating guides. In addition, the study team collected and analyzed government-wide guidance from the Office of Management and Budget such as OMB Circular A-11 and the Uniform Guidance, Government Accountability Office best practice guides on cost and schedule estimating for large capital projects and relevant audit reports, and records of congressional hearings and other documents that shed light on past congressional activity with respect to NSF's use of CAs. The team also performed a literature search and examined related materials on procurement, CAs, project management and earned value management (EVM). And, the study team reviewed documents and guidance from benchmark/comparable agencies including the National Aeronautics and Space Administration, Department of Energy, and Department of Defense to glean lessons learned and practices that might be instructive and transferable to NSF.

Results in Brief

Unlocking the secrets of science and pushing forward the frontiers of innovation are the visionary goals that guide the National Science Foundation in carrying out its mission. Created by the *National Science Foundation Act of 1950* (Public Law 81-507), the Foundation is an independent federal agency whose mission is to “promote the progress of science; to advance the

national health, prosperity, and welfare; to secure national defense; and for other purposes.” The 1950 Act creating NSF also established a National Science Board to set overall policies for the agency and advise the President and Congress on critical policy issues. Responsibility for day-to-day operations is vested in an appointed director who serves as the agency’s chief executive officer. The statutory joint leadership authority and accountability are quite unique among federal agencies.

State-of-the-art large facility construction projects are the highest profile efforts funded and supported by NSF and include the construction of such facilities as astronomical observatories, particle accelerators, and research vessels located worldwide. In addition to serving their primary purpose of supporting the scientific community, many of these projects have established the necessary infrastructure for other government agencies to achieve their missions, particularly with respect to national defense efforts. NSF does not operate these facilities, but supports their development, construction and operation with federal awards that are funded through cooperative agreements. NSF currently administers 33 CAs for large facility construction or operations totaling \$4.8 billion in obligations. Of these, 26 CAs are for large research facilities whose construction totaled over \$100 million each. As would be expected, these high dollar efforts are subject to significant attention from both the National Science Foundation Inspector General and Congress and have led to questions about the use of cooperative agreements to fund these projects and the adequacy of the management, oversight and accountability practices used to monitor them.

NSF is an agency in transition. An exemplar agency in promoting basic research following what is often referred to as the “Gold Standard in Merit Review” for assessing the merits of the scientific research, the agency is in the midst of a culture change shifting to a more management-oriented focus in how research projects are administered to add corollary management rigor and ensure proper stewardship of federal funds. In response to OIG and congressional concerns, NSF has undertaken a wide range of actions to improve project management and oversight under cooperative agreements, by strengthening or adding specific requirements that at a minimum, address the spirit, if not the letter, of previous recommendations. Additional actions are underway or planned; however, OIG has recently raised or reemphasized concerns in certain areas. The Academy Panel reviewed these concerns and offered recommendations and options to address those concerns—in particular, in the areas of contingency and management fee where oversight can be further strengthened.

Overall, the Academy Panel found that cooperative agreements are the appropriate mechanism to support large-scale research facilities. The mechanism is specifically designed to allow for substantial involvement on the part of the federal agency—and substantial involvement includes oversight. The critical success factor for these types of projects is the project management discipline—and the rigor of review processes—in place along with the capacity and capability of a skilled workforce to carry out and oversee project management responsibilities. The Panel’s

analysis of comparator agencies featured in the report provides lessons learned and identifies practices that can be adopted by NSF. In addition, the Panel identified NSF and NSB governance issues—in terms of both structure and practices—and offered a number of suggestions for strengthening agency management practices. NSF and NSB have considerable discretion in setting policy for the use of CAs.

The government-wide environment today is one of tight budgets and intensified oversight, a condition that is not likely to change in the near future. NSF will need to make some hard funding decisions that address the demand for more rigorous accountability systems balanced against the mission to advance science. In the long run, one does not necessarily have to be at the expense of the other—but there are likely to be short-term impacts as changes are implemented and institutionalized across the science community. The Academy Panel’s recommendations provide a number of actions and options to strengthen the oversight of MREFC projects and to enhance agency governance practices and processes.

Panel Recommendations

The Academy Panel’s recommendations are presented in chapters 3, 4, and 6 of the report. The first number for each of the thirteen recommendations listed below refers to the chapter in which it is located. Chapters 3 and 4 provide an overview of NSF policy and practices for cooperative agreements, contingency and management fee. Chapter 6 presents findings and recommendations on NSF and NSB governance and organizational issues.

Panel Recommendation 3.1

Objective: To bolster NSF’s ability to detect and address potential cost proposal issues prior to the release of award funds.

Recommendation: NSF should require that exceptions to the recommendations from pre-award cost analyses conducted by the Cost Analysis and Audit Resolution branch be reviewed by the Large Facilities Office and forwarded to the CFO for a final determination. The results of the CFO’s decision should be documented in writing and shared with the Major Research Equipment and Facilities Construction Panel prior to the release of award funds.

Implementation Steps:

- The responsible Office of Budget, Finance and Award Management (BFA) units should work together to establish the specific policy and procedures for implementing these additional requirements.

Panel Recommendation 4.1

Objective: To bolster internal controls for contingency by providing additional auditability and incentivizing project managers to use the funds judiciously and return unused funds for reallocation to other agency priorities.

Recommendation: NSF should retain control of a portion of an award recipient's contingency funds and distribute them with other incremental funds as needed.

Implementation Steps:

- NSF should (1) establish a trigger based on total project cost that will determine whether contingency will be held at three approval levels or two and (2) determine the appropriate percentage at each level based on a project's risk assessment. For projects over the threshold (e.g., projects totaling more than \$100 million), contingency should be held at the directorate, program, and project (award recipient) level. Under this model, for example, 35 percent of contingency could be held at both the directorate and program level and 30 percent could be held at the project level. For projects under the threshold, contingency would be held at only two levels with, for example, 50 percent held at the program level and 50 percent held at the project level.
- The responsible BFA office should coordinate with all offices responsible for the management, review, and approval of contingency fund expenditures to develop the policy and process for holding and distributing funds to the recipient and the attendant audit trail requirements for documenting requests and tracking use to the project's work breakdown structure.
- NSF should leverage current systems for managing funds to ensure that contingency funds can be distributed in a timely manner.

Panel Recommendation 4.2

Objective: To further strengthen NSF's policy on cost estimating and ensure rigor in the process.

Recommendation: NSF should change current language in the LFM so that it is clear that award recipients are expected to follow the guidance in GAO's Cost Estimating and Assessment Guide and Schedule Assessment Guide when developing cost and schedule estimates.

Implementation Steps:

- The LFO should work with stakeholders to identify and establish factors (e.g., risk, cost) that afford the flexibility to scope and scale the guidance based on what would be most appropriate for an individual project.

Panel Recommendation 4.3

Objective: To eliminate the additional management burdens and potential for funding inappropriate expenses posed by management fee.

Recommendation: NSF should eliminate the practice of including management fee in cooperative agreements in future projects.

Implementation Steps:

- The appropriate BFA office should develop NSF policy clarifying that management fee will no longer be included in federal awards.

Panel Recommendation 6.1

Objective: To improve transparency in how NSF and the Board work together to enable mission accomplishment and perform management oversight functions and to clarify and codify roles, responsibilities, and working relationships so that they are sustained beyond transitions that occur with leadership changes and expiration of Board members terms.

Recommendation: NSF and NSB should establish and publish a joint NSF-NSB duties and responsibilities document institutionalizing roles and addressing key working relationships.

Implementation Steps:

- NSF and Board leadership should develop a joint document highlighting key roles and responsibilities and delineating how they work together. Staff and stakeholder input should be solicited, as appropriate, prior to finalizing the document.
- The document should be shared with NSF and NSB staff and posted on both the NSF and NSB websites.
- The document should be reviewed annually and updated as necessary.

Panel Recommendation 6.2

Objective: To add more rigor to the process of reviewing MREFC project readiness and performance at varying stages.

Recommendation: NSF should re-scope the role and duties of the MREFC Panel and amend the Panel's charge to specifically include status update reviews of projects in the development and construction phases focusing on cost, schedule, and performance.

Implementation Steps:

- The LFO should work with the MREFC Panel to identify the staff support and information needs, including the analyses and assessments conducted by the Integrated Project Team (IPT), to execute its expanded duties.

Panel Recommendation 6.3

Objective: To help ensure that external review panels include experts with the requisite knowledge and experience to assess cost and schedule estimates and project performance on large facilities projects.

Recommendation: NSF should identify requirements for project management and financial management expertise related to large facilities projects and explicitly add the requirements to the criteria for selection of external reviewers. The criteria should be incorporated in both the Grant Proposal Guide and the Proposal and Award Manual.

Implementation Steps:

- The LFO should take the lead in developing the criteria based on lessons learned from past MREFC projects. The criteria should be vetted with all appropriate internal and external stakeholders.
- The Policy Office should incorporate the agreed-upon criteria in the Grant Proposal Guide and Proposal and Award Manual.

Panel Recommendation 6.4

Objective: To provide the NSF Director direct access to independent project and cost estimating expertise for reviewing MREFC projects.

Recommendation: NSF should establish a Federal Advisory Committee Act (FACA) advisory committee for the Director to use as a sounding board for objective insight on large research projects.

Implementation Steps:

- NSF should initiate the process for establishing a new federal advisory committee under FACA.

Panel Recommendation 6.5

Objective: To further build capacity in the Large Facilities Office and to clarify the role, authority and accountability of the Head of the Large Facilities Office on the MREFC Panel.

Recommendation: NSF Director should (1) authorize the LFO to hire two additional FTEs and (2) direct the MREFC Panel charter be revised changing the status of the LFO Head from a non-voting member to a full member with voting rights.

Implementation Steps: NSF should initiate the process for hiring additional LFO staff and revising the MREFC Panel charter.

Panel Recommendation 6.6

Objective: To reassess the need for a separate Facility Plan and only if validated, provide clarity on its: (1) purpose and uses, (2) target audience, and (3) key roles/responsibilities for its development.

Recommendation: NSF should evaluate how it develops and uses the NSF Facility Plan (processes, form and format) and how it aligns with the agency's current budget and strategic planning processes, assessing (1) the plan's value to both NSF and NSB decision-makers and key stakeholders, (2) whether a standalone plan is necessary or whether it can be incorporated into existing budget and strategic plans, and (3) if necessary as a standalone plan, who should be the lead for developing the plan.

Implementation Steps:

- The NSF Director and NSB Chair should establish a working group to analyze the current plan intent, key roles in the development process, and uses—and identify necessary adjustments.
- In assessing the NSF Facility Plan, the working group should validate who is the intended key customer(s) of the plan and seek input from both internal and external stakeholders.
- Assessment criteria should include determining the value (cost/benefit) of the plan and its relationship with other agency planning processes.
- Recommendations should be vetted with all appropriate internal and external stakeholders.

Panel Recommendation 6.7

Objective: To develop and strengthen project management skill capabilities across the agency.

Recommendation: NSF should identify project management skill requirements by role and develop/implement required corollary role-specific project management training/workshops.

Implementation Steps:

- The LFO should work with the NSF Academy to conduct a needs assessment to identify project management knowledge and skill requirements by role and use the results to develop and implement role-specific project management curricula.
- The LFO and NSF Academy should develop NSF-tailored seminars for senior leadership focused on their oversight responsibilities.
- The NSF Academy should explore arrangements with other federal agencies such as NASA and DOE to take advantage of established federal courses addressing project management principles for capital investments, EVM, work breakdown structure, cost estimating, and the like.

Panel Recommendation 6.8

Objective: To ensure that award recipients have the requisite project management experience and knowledge to successfully lead a MREFC project.

Recommendation: NSF should require award recipient project managers be certified in project management. NSF should also specify the minimum project management experience thresholds for project positions in the programmatic terms and conditions of the cooperative agreement.

Implementation Step:

- NSF program officers and Grants and Agreements Officers should work together to include project management certification and requisite experience requirements in cooperative agreements for MREFC projects.

Panel Recommendation 6.9

Objective: To facilitate project management knowledge sharing across the agency and with award recipients.

Recommendation: NSF should formally establish communities of practice to share best practices and implement a “lessons learned” requirement for all MREFC projects.

Implementation Steps:

- The NSF Academy should promote the formation of communities of practices and encourage staff participation.
- The LFO should develop a lessons learned process and template to capture instructive experiences from projects and to inform policies and practices to strengthen the management of future projects.

Biography for Cynthia Heckmann

Cynthia Heckmann served as Project Director on the National Academy of Public Administration's recent review of the National Science Foundation's use of cooperative agreements to support the development, construction, and operations of state-of-the-art large scale, multi-user research facilities. Ms. Heckmann previously served as Project Director on the Academy's reviews of the Department of Justice's Civil Rights Division and the Center for Disease Control (CDC) Human Resource Process Review. Her extensive career at the Government Accountability Office includes serving as the Chief Human Capital Officer (CHCO) and Deputy Chief Information Officer. She also has executive branch experience, as well as state government experience. She has served as a strategic advisor on research studies for the Partnership for Public Service and is a CHCO SAGE—Strategic Advisor for Government Executives—for the Partnership. Ms. Heckmann holds a Masters of Public Administration from Northeastern University and a Bachelor of Arts from Simmons College. She also attended the Executive Fellows Program at Harvard University's John F. Kennedy School of Government and Yale University's School of Organization and Management.