

**Audit of Funding for Major Research  
Equipment and Facilities**

**National Science Foundation  
Office of Inspector General**

**May 1, 2002  
OIG 02-2007**

# Audit of Funding for Major Research Equipment and Facilities

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# Audit of Funding for Major Research Equipment and Facilities

## EXECUTIVE SUMMARY

### Purpose

The audit objective was to determine if the National Science Foundation (NSF) is solely using its Major Research Equipment (MRE) appropriation account to fund the construction and acquisition costs for major research equipment and facilities and to determine if NSF has established adequate management controls to ensure that these expenditures are derived solely from MRE appropriations.

### Background

NSF established the MRE account in fiscal year (FY) 1995 to provide funding for the construction of major research equipment and facilities that provide unique capabilities at the cutting edge of science and engineering. Through FY 2001, NSF has provided over \$600 million of funding from the MRE account for major research equipment and facilities. In December 2000, the NSF Office of Inspector General (OIG) reported that the Gemini Project had exhausted its \$184 million of MRE funding for construction and commissioning and had used or was planning to use operating funds from the Research and Related Activities (RRA) appropriations account to cover at least \$52.8 million in excess construction and commissioning costs.<sup>1</sup> Subsequently, the former Chairman of the Subcommittee on VA, HUD and Independent Agencies of the Senate Appropriations Committee, in a letter dated May 22, 2001, requested that the NSF OIG perform further work to determine if other major research equipment and facilities projects have financial management issues similar to those found with the Gemini Project.

### Results in Brief

Although the NSF has made a concerted effort to improve its management and oversight of projects receiving funding from the MRE appropriation account, NSF can improve its financial management of these projects. NSF's policies and practices do not yet provide adequate guidance for program managers to oversee and manage the financial aspects of major research equipment and facilities. These policies have allowed NSF to use multiple appropriation accounts to fund the acquisition and construction costs of major research equipment and facilities, and led to inconsistencies in the types of costs funded through the MRE account. Additionally, NSF's current practice is to track only those costs funded from the MRE account and not the full cost of the major research equipment and facilities. As a result, NSF cannot ensure that it stays within its authorized funding limits or that it provides accurate and complete information on the total costs of major research equipment and facilities to decision-makers for use in evaluating performance.

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<sup>1</sup> OIG Report No. 01-2001, *Audit of the Financial Management of the Gemini Project*, December 15, 2000. In its response to the report, NSF management disagreed with this conclusion. NSF contends that the excess costs were operational costs and therefore, were properly funded through the RRA rather than the MRE appropriation account.

## **Recommendations**

We recommend that NSF improve its financial management and accounting policies and procedures to ensure that it manages and oversees the full cost of major research equipment and facilities. These improvements must ensure that NSF tracks the total costs of the major research equipment and facilities in accordance with Federal accounting and management guidance, develops the appropriate financial management practices to oversee its major research equipment and facilities, specifies how cost overruns are to be handled, and uses appropriation accounts in accordance with their stated purpose. In addition, NSF needs to provide training on the updated policies and procedures to all NSF personnel involved with the funding and accounting for major research equipment and facilities.

## **Agency Response**

To date, NSF has not formally responded to our draft report. We provided the agency with an initial discussion draft, and corresponded and met with representatives from the Office of Budget, Finance, and Award Management. Based upon those discussions, we made several changes to our draft report. In an interim letter, NSF advised us that they would respond officially to our report by June 15, 2002. We have included that letter, in full, as Appendix B.

## **Audit of Funding for Major Research Equipment and Facilities**

### **INTRODUCTION**

#### **Background**

The National Science Foundation (NSF) established the Major Research Equipment (MRE) appropriations account for fiscal year (FY) 1995 to provide funding for the construction of major research equipment and facilities that provide unique capabilities at the cutting edge of science and engineering.<sup>2</sup> Projects supported by this account are expected to push the boundaries of technological design and offer significant expansion of opportunities, frequently in totally new directions, for the science and engineering community.

The account is NSF's primary vehicle for funding major, multi-million dollar scientific and engineering research equipment and facilities that often cost tens or even hundreds of million dollars. NSF established this budget account to promote effective planning and management for the support of such sizable investments made over a limited period of time. Specifically, the MRE account was intended to:

- Provide funding for construction and acquisition of major research equipment and facilities;
- Avoid distortions in the budgets of directorates/offices that result when funding for large projects is included;
- Ensure that resources are available to complete projects that are funded over several years; and
- Distinguish the slow outlays for construction projects.

To be funded from the MRE account, a project must meet several eligibility requirements and go through a review and approval process. The NSF program sponsoring the project must develop a project paper, including a cost profile, schedule, and a project management synopsis. This project proposal package is then reviewed and approved sequentially by a panel of senior NSF management, then by NSF's Director, and finally by the National Science Board (NSB).

Through FY 2001, NSF has provided over \$600 million of funding from the MRE account for the following major research equipment and facilities:

- Gemini Observatory;
- Laser Interferometer Gravitational Wave Observatory;
- South Pole Safety Project;
- Atacama Large Millimeter Array (formerly known as Millimeter Array);

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<sup>2</sup> Congress has since changed the name of NSF's Major Research Equipment appropriation account to Major Research Equipment and Facilities Construction, to better reflect the purpose, activities, and costs to be funded from this account. Making appropriations for the Departments of Veterans Affairs and Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 2002, and for other purposes, Pub. L. No. 107-73 (2001).

- Large Hadron Collider;
- Polar Support Aircraft Upgrades;
- South Pole Station Modernization;
- George E. Brown, Jr., Network for Earthquake Engineering Simulation;
- Terascale Computing Systems; and
- High Performance Instrumented Airborne Platform for Environmental Research.

In December 2000, the NSF Office of Inspector General (OIG) reported on the financial management of the Gemini Observatory Project (Gemini Report), which was one of the two original major research equipment and facility projects.<sup>3</sup> According to the audit report, the Gemini Project had exhausted its \$184 million of MRE funding for construction and commissioning and had used or was planning to use operating funds from the Research and Related Activities (RRA) appropriations account to cover at least \$52.8 million in excess construction and commissioning costs.<sup>4</sup>

In light of the Gemini Report, Senator Christopher Bond, the former Chairman of the Subcommittee on VA, HUD and Independent Agencies of the Senate Appropriations Committee, in a letter dated May 22, 2001, stated his concerns about the use of RRA funds to supplement the costs of major research equipment and facilities, and requested that the NSF OIG perform further work to determine if other major research equipment and facilities projects have financial management issues similar to those found with the Gemini Project.

### **Objectives, Scope & Methodology**

The audit objectives were to determine if NSF is solely using its MRE appropriation to fund construction and acquisition costs for major research equipment and facilities and to determine if NSF has established adequate management controls to ensure that these expenditures are derived solely from MRE appropriations.

The scope of our audit included the ten projects receiving MRE funding during the period from FY 1995 through FY 2001; however, we performed limited work on the Gemini Observatory, which we had previously audited, and the Laser Interferometer Gravitational Wave Observatory, which is currently being audited by the Defense Contract Audit Agency at our request. In addition, we performed limited work on the Atacama Large Millimeter Array and the High Performance Instrumented Airborne Platform for Environmental Research because these projects have not yet reached the construction phase.

To meet the audit objectives, we queried NSF's financial system to identify awards receiving funding from the MRE account, reviewed obligation reports to determine if these awards were receiving funds from other appropriations, and traced the NSF award histories of the principal investigators on the awards to determine if they were obtaining additional funding for the projects through other awards.

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<sup>3</sup> The Gemini Observatory and the Laser Interferometer Gravitational Wave Observatory were the first projects funded from the MRE account.

<sup>4</sup> OIG Report No. 01-2001, *Audit of the Financial Management of the Gemini Project*, December 15, 2000. In its response to the report, NSF management disagreed with this conclusion. NSF contends that the excess costs were operational costs and therefore, were properly funded through the RRA rather than the MRE appropriation account.

We also held discussions with program managers and other NSF personnel responsible for managing the major research equipment and facilities projects and implementing NSF policies and procedures. We also reviewed current and past NSF policies related to the account as well as Federal management and accounting requirements.

This audit was performed in accordance with generally accepted government auditing standards from June 2001 through March 2002.

## **RESULTS OF AUDIT**

Although the National Science Foundation (NSF) has worked diligently to provide state-of-the-art major research equipment and facilities<sup>5</sup> and has made a concerted effort to improve its management and oversight of projects receiving funding from the Major Research Equipment (MRE) appropriation account, NSF can improve its financial management of these projects. NSF's policies and practices have been changing over time, but do not yet provide adequate guidance for program managers to oversee and manage the financial aspects of major research equipment and facilities. These policies have allowed NSF to use multiple appropriation accounts to fund the acquisition and construction costs of major research equipment and facilities, and led to inconsistencies in the type of costs funded through the MRE account. Additionally, NSF's current practice is to track only those costs funded from the MRE account and not the full cost of the major research equipment and facilities. As a result, NSF cannot ensure that it stays within its authorized funding limits or that it provides accurate and complete information on the total costs of major research equipment and facilities to decision-makers for use in evaluating performance.

Congress has also indicated its concern about NSF's financial management of major research equipment and facilities projects. In the fiscal year (FY) 2002 House Appropriations Committee Conference Report<sup>6</sup> (House Conference Report), Congress specified the appropriation account that was to fund each phase of a project's life cycle and required a full life-cycle cost report for each major research equipment and facility project.<sup>7</sup>

Given the high dollar, long term, and comprehensive nature of major research equipment and facilities, NSF needs to ensure that its financial and management policies, guidelines, and practices provide a total life-cycle focus to clearly and consistently identify, record, track, and report the full costs of its major research equipment and facilities, in accordance with the appropriate financial accounting standards and guidance.

### **NSF's Efforts to Improve the Financial Management and Oversight of Facilities Projects**

In response to the audit of the financial management of the Gemini Project,<sup>8</sup> Congressional interest, and efforts by the Office of Management and Budget (OMB), NSF has developed and begun to implement a Large Facility Projects Management and Oversight Plan (the Plan). The Plan provides a strategy for improving the selection,

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<sup>5</sup> For this report, major research equipment and facilities refer to those equipment and facilities receiving at least partial funding from the MRE account.

<sup>6</sup> H.R. CONF. REP. NO. 107-272 (2001).

<sup>7</sup> This report requirement was also contained in the resulting Appropriation Act entitled: Making appropriations for the Departments of Veterans Affairs and Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 2002, and for other purposes, Pub. L. No. 107-73 (2001).

<sup>8</sup> OIG Report No. 01-2001, *Audit of the Financial Management of the Gemini Project*, December 15, 2000.

management, and oversight of large facility projects, including major research equipment and facilities, and has four major goals:

- To address organizational needs within NSF to effectively manage large facility projects by establishing a Business Oversight Team headed by a new Deputy Director for Large Facility Projects, and by using Project Advisory Teams composed of both business operations staff and scientific and technical staff to advise and assist project managers;
- To implement guidelines and procedures for all aspects of facilities planning, management, and oversight, emphasizing post-award project oversight of construction and management;
- To improve the process for reviewing and approving all large facility project proposals; and
- To properly oversee facility projects to ensure their success by requiring a management plan for each proposal, developing a model template for post-award project review and by conducting regular oversight reviews.

NSF is currently recruiting for the Deputy Director for Large Facility Projects position. This Deputy will serve as NSF's principal agent for monitoring the business operations aspects of large facility projects' design, construction/acquisition, operation, management, and oversight. Additionally, the Deputy, in partnership with NSF Program Managers and Project Advisory Teams, will play a lead role in the development, implementation, and continuous improvement of NSF management and oversight policies, guidelines, and procedures for large facilities projects. NSF expects to complete the strategy outlined in the Plan in FY 2002.

### **Funding and Tracking of Major Research Equipment and Facilities Costs**

In addition to the Plan's strategy to improve the management and oversight of major research equipment and facilities, NSF will need to further develop and improve its own financial management policies and practices to effectively manage, oversee, and report the costs of its major research equipment and facilities. Specifically, to effectively manage and oversee the funding and costs of major research equipment and facilities, NSF needs to ensure it uses appropriation funds consistently and tracks the full life-cycle costs of these facilities.<sup>9</sup>

Since the inception of the MRE account, NSF's policies for using this account to fund the costs of major research equipment and facilities have been inconsistent with the purpose of the account. When NSF established the MRE appropriation account in fiscal year 1995, the stated purpose of the account was to fund the acquisition and construction of major research equipment and facilities. However, NSF's implementing policies and procedures did not reflect this purpose. Rather, NSF's initial MRE Guidelines,<sup>10</sup> as well as its 1997 revision to the Guidelines, stated that cost overruns would not be funded from the MRE account. As a result, funds from other appropriations, such as the Research and Related Activities (RRA) or the Education and Human Resources (EHR)

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<sup>9</sup> According to the Capital Programming Guide, Supplement to A-11, Part 3, the full life cycle costs include all costs for planning, procurement (purchase price and all other costs incurred to bring it to a form and location suitable for its intended use), operations and maintenance.

<sup>10</sup> The initial MRE Guidelines were established in Staff Memorandum O/D 94-29 dated November 28, 1994.

accounts, could be used to fund acquisition and construction costs of major research equipment and facilities, when additional funding was needed.

In addition, MRE funds could be used to fund none, some, or all of a facility's pre-construction costs depending upon when a facility was approved for MRE funding. For example, the initial version of the Guidelines allowed all costs to be funded from the MRE account once a project received MRE status. However, the 2001 revision allowed only approved research and development costs, in addition to the costs of construction. Over time, these policies allowed and contributed to inconsistent funding practices.

At the same time, NSF's accounting system did not, and currently does not, track all costs incurred for its major research equipment and facilities. Instead, NSF generally tracks only those costs funded from the MRE account. Costs funded from other appropriations, such as the RRA or the EHR accounts, do not get charged or tracked to the major research equipment or facility. As such, NSF's total contribution to the major equipment or facility is not easily known. To identify all costs requires a search of NSF's award and investigator history databases and interviews of NSF program personnel. Even then, one cannot be sure of identifying all costs of a particular project.

The following cases demonstrate difficulties NSF faces in identifying the financial costs of its major research equipment and facilities projects:

- The Large Hadron Collider (LHC) is a major research equipment and facilities project for the construction of two high-energy particle detectors, A Toroidal Large Angle Spectrometer (ATLAS) and the Compact Muon Spectrometer (CMS). These detectors will be the major data collecting instruments at the LHC facility at the CERN laboratory in Switzerland. They are scheduled to become operational starting in 2006.

Under a 1997 international agreement,<sup>11</sup> the US Department of Energy and NSF agreed to participate in LHC activities, with NSF contributing financial support, not to exceed the National Science Board (NSB) authorized amount of \$81 million over 10 years, to the US ATLAS and CMS Collaborations. The agreement specified the support was for responsibilities described in the Experiments Protocol, and incorporated Memoranda of Understanding to be carried out during the construction of the ATLAS and CMS detectors. This included responsibilities for the development of the detectors' offline computing and software systems. NSF is funding the entire \$81 million through the MRE account, and is providing the funds through awards to two universities, under which each university leads a group of participating institutions.

In order to meet its commitment under the 1997 agreement, the project will require additional funds. However, without sufficient MRE funds, NSF plans to cover the additional costs with RRA funds; it has already provided over \$2 million in RRA funds for software development. Additionally, NSF is currently considering proposals for an additional \$57 million for software development, detector installation and

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<sup>11</sup> International Co-Operation Agreement between The European Organization for Nuclear Research (CERN) and The Department of Energy of the United States of America and The National Science Foundation of the United States of America concerning Scientific and Technical Co-Operation on Large Hadron Collider Activities, December 8, 1997.

commissioning, computing infrastructure for researchers, and other pre-operational costs and is planning to fund these costs through the RRA account.

Finally, NSF has been providing additional RRA funding directly to participating universities for “base program support,” as well as specific research and development costs in support of the LHC project. Since NSF’s accounting system tracks only the costs reflected in the MRE account as the total cost of the project, these additional RRA costs are not recognized as part of this project. NSF’s contribution to the LHC Construction will total at least \$140 million; 73 percent greater than the \$81 million currently funded by the MRE account.

- In November 1998, the George E. Brown, Jr., Network for Earthquake Engineering Simulation (NEES) received NSB approval for \$81.9 million to provide a national, networked collaboratory of geographically distributed, shared use, experimental research equipment sites, with teleobservation and teleoperation capabilities. NSF is funding these costs from the MRE account.

However, in addition to the MRE funding, NSF also provided \$1.1 million in co-funding from its Education and Human Resources (EHR) appropriation, through the Experimental Program to Stimulate Competitive Research (EPSCOR) Program. While the awardee was located in an EPSCOR designated state, and therefore, was properly eligible for EPSCOR funding, NSF provided these funds for the primary purpose of acquiring and constructing earthquake simulation equipment. Also, NSF’s financial management system accounted for the co-funding as part of the EPSCOR program and as a result, the system does not identify the co-funding as part of the total costs. Therefore, although the NSB approved NEES project is \$81.9 million and the accounting system will report this amount, the actual total cost of the project will be at least \$83 million.

- The Polar Support Aircraft Upgrades is a major research equipment and facilities project to upgrade and modify three NSF-owned aircraft to meet Air Force safety and operability standards.

When the project began in FY 1998, NSF provided funding from the RRA account to fund engineering and other costs so it could begin the replacement and modification of major parts and systems of the three LC-130 aircraft. However, NSF’s accounting system did not track this funding and as a result, NSF has reported different amounts on the cost of this initial work. Documentation submitted to the National Science Board has reported \$4.3 million in RRA funding,<sup>12</sup> while budget documentation has reported only \$4 million.<sup>13</sup>

NSF also used two appropriations to fund this project, even though the nature of the work performed was the same for all three aircraft. In FY 1999 and 2000, the project received MRE funding totaling of \$32 million to modify and upgrade the aircraft, including engineering, which NSF funded from the MRE account. Then, in FY 2002, the project obtained additional MRE funding of \$885,000, for technical documentation and program management.

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<sup>12</sup> Funding Status for Polar Support Aircraft Upgrades (NSB/PPP-01-10) dated May 15, 2001.

<sup>13</sup> NSF’s Justification of Estimates of Appropriations to Congress for fiscal years 1999 and 2000.

NSF will also be using additional funding to complete the upgrade of the aircraft. The initial project included replacing the wings of one aircraft, which was funded through the MRE account. However, after the project had begun, the Air Force informed NSF that the other two aircraft also needed wing replacements. NSF is planning to use approximately \$1 million of RRA funds to cover these modifications, although the tasks and purpose of replacing the wings of the three aircraft are the same.

- The Atacama Large Millimeter Array (ALMA) is a major research equipment and facilities project for the world's most sensitive, highest resolution, millimeter wavelength telescope. The project was planned to consist of forty 8-meter diameter radio telescopes. However, with the formation of a U.S.-European partnership, the planned facility has expanded to sixty-four 12-meter diameter antennas.

Funding for ALMA has not been consistent with funding practices for other MRE-funded projects. Unlike the others, the initial approval for ALMA was not for construction work. Rather, NSF requested and received Congressional approval for MRE funding of the project's design and development costs. From FY 1998 through FY 2001, this project received \$32 million of MRE funds, solely for design and development.

As a result of these types of inconsistencies in NSF's policies, guidelines, and practices for funding and tracking costs of major research equipment and facilities, one cannot examine the MRE account and determine the total construction costs of these projects with any accuracy. Readily identifying the full cost that NSF's different appropriations paid for these projects is also difficult. Without consistent policies for charging specific appropriations for major research equipment and facilities costs, or complete information on the total costs of these projects, NSF has limited ability to manage the financial aspects of its major research equipment and facilities.

### **Effects of Not Accounting for Total Costs of Major Research Equipment and Facilities**

When information on the costs of major research and facilities is not accurate or complete, decision-makers may not have an adequate basis for their subsequent judgments and actions. Decision-makers, including NSF management, NSB, Congress, and OMB, need cost information for many purposes. For example, when budgeting, cost information is important for estimating the total costs of projects and establishing funding priorities. Once a project budget is set, actual cost information provides feedback that decision-makers can use to control and reduce costs, as well as find and avoid waste. Cost information is also an integral part of measuring performance as a basis to evaluate continued funding of a project against other funding opportunities.

However, as indicated in the above examples, NSF has not always been consistent in its practices for funding or tracking major research equipment and facilities costs. This lack of consistency has resulted in obscuring the true cost of major research equipment and facilities. Tracking only the acquisition and construction costs paid for with MRE funds fails to recognize the costs of the project funded from other sources. It can also

provide decision-makers with incomplete information regarding the amount of funds needed to complete the acquisition and construction of major research equipment and facilities, as well as the costs needed to operate and maintain the equipment and facilities.

The consequences of these practices are that other educational and research-funding opportunities are missed and could result in the nature of the activities supported by each Directorate's budget being distorted. In particular, the EHR and RRA appropriation accounts are intended to improve education and human resource development, as well as fund research activities that spur new knowledge, increase understanding, and offer increased opportunities for economic growth. However, when funding for the acquisition and construction of major research equipment and facilities comes from other appropriations, NSF misses opportunities to fund awards in support of these other appropriations' goals. In addition, the nature of the activities supported by each Directorate's budget can become distorted when it is used to fund major acquisition and construction, rather than its intended mission.

### **MRE Appropriation Account Funds Both Critical Assets and Research Tools**

The MRE account provides funding for two distinctly different types of projects: those that invest in state-of-the-art, scientific tools for research and development of new knowledge and ideas; and those that support the investment in mission critical property, plant and equipment (PP&E), owned by NSF, that provide the facilities and logistical means for a broad range of science to take place, primarily in NSF's Polar Programs. Both of these types of projects require good project management (i.e., planning, budgeting, construction, and risk management) to ensure that these multimillion-dollar projects are on schedule, within budget, and perform as expected. Both types of projects require total cost accounting in accordance with the Statement of Federal Financial Accounting Standards (SFFAS) No. 4: Managerial Cost Accounting Standards. But funding both of these types of projects from one appropriation account creates a situation where the replacement, renovation, and upkeep of assets critical to the safety and health of researchers could potentially compete for limited funding with new and improved scientific tools. As such, NSF may want to consider prioritizing the mission critical PP&E projects separately from the development and construction of research tools, as well as differentiating their funding source, to avoid any possible negative impact on the broad range of programs these assets support.

### **Financial Management Policies and Procedures Need To Be Improved**

Although NSF has funded large science facilities in the past, in recent years, NSF's portfolio of facilities has grown and diversified to include distributed projects that challenge traditional management and oversight approaches. Emerging multidisciplinary science and engineering opportunities have also resulted in NSF moving towards funding a greater number of large facilities projects that are increasingly complex, and present challenging technical and management issues.

However, to date, NSF has not fully developed the policies and procedures needed to oversee and manage the financial aspects of major research equipment and facilities.<sup>14</sup> The majority of NSF awards are relatively small; traditionally funding small, single-investigator projects averaging approximately \$100,000 over a limited period of time. NSF's financial management policies and procedures appear to be geared toward these small awards rather than to the large facilities.

Currently, NSF's policy for major research equipment and facilities projects is the "Guidelines for Planning and Managing the Major Research Equipment Account." These Guidelines address only the MRE appropriation account, and not the full funding for the major research equipment and facilities. Also, the Guidelines recommend only a single financial review during the life of a project and do not provide any guidance on how to perform that financial review. A single financial review of the project is insufficient to ensure that costs incurred to date, as well as estimated future costs, are within the funding types and levels authorized, and may preclude additional funding requests from being considered in the annual budget cycle. The current MRE Guidelines also do not address how NSF is to handle cost overruns. While earlier versions of the Guidelines<sup>15</sup> stated that cost overruns should be funded through non-MRE accounts, the current Guidelines are silent on the issue of handling potential and actual cost overruns and provide no direction to NSF project managers.

Additionally, NSF's policies and procedures do not require tracking NSF's total investment in the major research equipment and facilities. Federal accounting and management guidance requires that the full cost of major research equipment and facilities be tracked, from the planning stage through operations and maintenance.<sup>16</sup> For its major PP&E projects, NSF should include full costs, including operations, in its financial reports in accordance with Federal accounting standards.<sup>17</sup> For those major research equipment and facilities tools funded by NSF, but held by colleges, universities and other entities, NSF should report the full costs as a supplemental part of its financial reporting.<sup>18</sup> According to NSF financial personnel, NSF's financial system has the capability to identify and track the full costs of major research equipment and facilities. Currently, however, NSF's policies do not address accounting for the full cost of major research equipment and facilities and, accordingly, has contributed to the current practice of recognizing only costs funded by the MRE account as the costs of these projects.

To address some of these issues, Congress indicated in its FY 2002 House Conference Report,<sup>19</sup> that NSF should make changes to the MRE account. First, as mentioned earlier, Congress changed the name of the account to the Major Research Equipment

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<sup>14</sup> In implementing its "Large Facility Projects Management and Oversight Plan," NSF is currently developing a new policy for its Proposal and Award Manual entitled, "Planning and Managing of Large Infrastructure Projects."

<sup>15</sup> "Criteria and Implementation Procedures for the Major Research Equipment (MRE) Account," dated November 28, 1994, and revision dated June 6, 1997.

<sup>16</sup> Appendix A describes the Accounting Standards and Management Guidelines that are applicable to NSF's accounting systems and practices.

<sup>17</sup> Statement of Federal Financial Accounting Standards (SFFAS) No. 6, "Accounting for Property, Plant, and Equipment."

<sup>18</sup> SFFAS No. 8, "Supplementary Stewardship Reporting," (Chapter 7 – Research and Development).

<sup>19</sup> H.R. CONF. REP. NO. 107-272 (2001).

and Facilities Construction (MREFC) to better reflect the purpose, activities, and costs to be funded with the appropriations made available through this account. In addition, Congress clarified the use of funds from MREFC account and the RRA account by indicating that the MREFC account is to provide resources for the acquisition, construction, and commissioning of large scale research equipment and facilities and the RRA account is to fund planning, design, operations, and maintenance costs.

This Congressional guidance not only defines how the appropriations should be used to fund major research equipment and facilities, but also determines when projects will be eligible to receive MREFC funding. Unless a specific exception is granted, MREFC funding is limited to the costs of acquisition, construction, and commissioning, and can no longer be used to fund planning and design costs as it has in the past. Finally, in addition to defining the funding source, Congress also required that NSF submit a report on the full life-cycle costs of projects funded through the MRE account.<sup>20</sup> To comply with these directives and improve its financial management, NSF will have to review, revise and implement its financial management policies and procedures.

### **CONCLUSION & RECOMMENDATIONS**

NSF established the Major Research Equipment appropriation account for FY 1995 to fund the acquisition and construction of major research equipment and facilities that provide unique capabilities at the cutting edge of science and engineering. The projects supported by this account are expected to push the boundaries of technological design and offer significant expansion of opportunities in totally new directions for the science and engineering community. Due to their importance to NSF's strategic goals and their high cost, these projects require special management attention, from inception through actual operation. However, to date the projects have been handled inconsistently in terms of tracking costs and funding sources. As such, NSF needs to enhance its financial management policies and practices to provide this higher level attention and ensure NSF maintains its capabilities to effectively lead the scientific community.

Specifically, NSF needs to ensure that the management for major research equipment and facilities is consistent with the directives in the FY 2002 appropriation by reviewing and revising its policies and procedures to ensure adherence to the guidance. Additionally, the costs to be funded from the MREFC and RRA appropriation accounts need to be clearly defined. NSF needs to include an upfront process to ensure consistent treatment of costs, such as software development, that are not always clearly classifiable as construction (MREFC-funded) or research (RRA-funded). In addition, NSF should enhance its guidance on financial management to include tracking and assessing the full cost of major research equipment and facilities, to clarify the treatment of cost overruns, and to provide instructions on performing a financial review.

NSF also needs to take advantage of the capabilities of its accounting system and processes to identify, accumulate, and track the funding and total costs of the major research equipment and facilities in accordance with the applicable accounting

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<sup>20</sup> Making appropriations for the Departments of Veterans Affairs and Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 2002, and for other purposes, Pub. L. No. 107-73 (2001).

standards and management guidance. To implement these changes, finance and program personnel will have to work together to ensure costs are funded by the correct appropriations account and charged to the appropriate research equipment and facilities project. In addition, personnel who review agreements and awards must also ensure compliance with the funding and costing policies.

Lastly, to accomplish this, NSF will have to ensure not only that the policies and procedures are developed, but also that these changes are implemented. NSF will need to provide training to its personnel in all organizations that take part in these projects including the Directorates and Programs sponsoring the projects and the Office of Budget, Finance and Award Management including the Divisions of Grants and Agreements; Contracts, Policy and Oversight; and Financial Management.

We, therefore, recommend that the Chief Financial Officer of the National Science Foundation, as part of the implementation of the Large Facility Projects Management and Oversight Plan:

1. Continue to improve the NSF's financial management and accounting policies and procedures to ensure that NSF manages and oversees the full cost of major research equipment and facilities. These improvements must ensure that NSF:
  - Identifies, records, and tracks the total costs of the major research equipment and facilities in accordance with Federal accounting and management guidance;
  - Uses good financial management practices to oversee its major research equipment and facilities and awardees, including tracking actual costs and conducting adequate financial reviews throughout the life of the project to ensure that actual costs and estimated future costs are within the funding types and levels authorized;
  - Incorporates procedures to specify how potential and actual cost overruns are to be handled and subsequent funding approved; and
  - Uses appropriation accounts in accordance with the Congressional guidance in the FY 2002 Appropriation regarding the use of funds from the Major Research Equipment and Facility Construction and Research and Related Activities appropriation accounts
2. Provide training on the updated policies and procedures to all NSF personnel involved with the funding and accounting for major research equipment and facilities including program management in the sponsoring Offices and Directorates and the Office of Budget, Finance and Award Management.

### **AGENCY RESPONSE**

To date, NSF has not formally responded to our draft report. We provided the agency with an initial discussion draft, and corresponded and met with representatives from the Office of Budget, Finance, and Award Management. Based upon those discussions, we made several changes to our draft report. In an interim letter, NSF advised us that they would respond officially to our report by June 15, 2002. We have included that letter, in full, as Appendix B.

## Appendix A

### Audit of Funding for Major Research Equipment Projects Accounting Standards and Management Guidelines

The Federal Government has established accounting standards and management guidelines that are applicable to major research equipment and facilities. The standards and guidance used as criteria for this report are listed below.

- Statement of Federal Financial Accounting Standards No. 4: Managerial Cost Accounting Standards
- Statement of Federal Financial Accounting Standards No. 6: Accounting for Property, Plant, and Equipment
- Statement of Federal Financial Accounting Standards No. 8: Supplementary Stewardship Reporting
- Statement of Federal Financial Accounting Standards No. 10: Accounting for Internal Use Software
- Capital Programming Guide, Supplement to Office of Management and Budget Circular A-11, Part 3

Audit of Funding for Major Research Equipment Projects

Interim Agency Response

**NATIONAL SCIENCE FOUNDATION  
ARLINGTON, VA 22230**

***Office of Budget, Finance  
& Award Management***

**MEMORANDUM**

**Date:** April 26, 2002  
**To:** Assistant Inspector General for Audit  
**From:** Chief Financial Officer  
**Subject:** Official Draft Report: Audit of Funding for Major Research Facilities  
Equipment and Facilities

Thank you for your draft report "Audit of Funding for Major Research Equipment and Facilities." The Foundation fully agrees with the goal of strengthening NSF's financial management of major research facilities. We all recognize that the next generation of shared research instruments will be more complex and more difficult to develop, and we will always seek -- as you recommend -- to improve our training of NSF personnel responsible for overseeing those facilities.

NSF also strongly believes in continual improvement of our financial management policies and practices, particularly with respect to MREFC projects. Based on previous OIG recommendations, NSF has segregated new facility awards to fully and separately account for the costs to be funded through from the MREFC account, as well as to fully and separately account for the Operations, Maintenance and other costs supported through the R&RA account. We have developed a Large Facilities Projects Management and Oversight Plan. As part of that plan, I am in the process of hiring a new Deputy for overseeing financial management of large facilities. And the Foundation has set up a working group to develop guidelines and procedures devoted to the effective management of NSF's major research facilities.

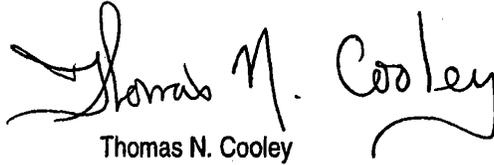
The leading-edge nature of each new major research facility presents unique challenges that generalized policies and procedures do not always accommodate. Although general guidelines and procedures are necessary, experienced and successful managers of large multi-million or multi-billion dollar projects also know that challenges always occur that are specific to the project's planning, location, design, and construction. Because each MREFC project is truly a one-of-a-kind project, the evolution of our MRE policies over the years has greatly benefitted from the lessons we have learned while designing and constructing these new facilities. We know there is more to do to refine our policies and procedures for fiscal management of large facilities, but we also know that the Foundation has been particularly successful in bringing these new facilities on-line. The value of these projects in advancing scientific knowledge and inquiry, and their contributions to the economic welfare of this country, remains

Audit of Funding for Major Research Equipment Projects

Interim Agency Response

undisputed. Our goal is to continue to achieve similar success with the financial management of these facilities, relying on reasonable management practices that will instill a high level of confidence in our stewardship of taxpayer dollars.

Your draft audit report sets forth several recommendations, based in part on characterizations that do not fully and accurately describe our processes or the specific projects mentioned. We appreciate, of course, the draft nature of your report, and we want to take the time necessary to respond with helpful information and to make sure that we both fully understand the context and the policies in place at the time decisions were made. In addition, we need to fully understand your specific concerns with the Foundation's accounting system and how you believe our systems could be improved. We will provide a detailed response to your draft report no later than June 15, and look forward to further interactions and discussions with your Office. In the meantime, we will continue to provide Congress with up-to-date information and a full accounting, of the status and projected costs of all NSF major facilities.



Thomas N. Cooley

NATIONAL SCIENCE FOUNDATION  
4201 WILSON BOULEVARD  
ARLINGTON, VIRGINIA 22230



OFFICE OF THE  
DIRECTOR

June 14, 2002

Honorable Barbara A. Mikulski  
Chair  
Subcommittee on VA, HUD & Independent Agencies  
Committee on Appropriations  
United States Senate  
Washington, DC 20510

Dear Madam Chair:

I am pleased to enclose the National Science Foundation's response to the May 1, 2002 Audit of Funding for Major Research Equipment and Facilities prepared for the Subcommittee by the NSF's Office of the Inspector General (OIG). It represents hundreds of hours of work by NSF staff in coordination with the OIG. It should put to rest any concerns the Congress might have about NSF's past and present accounting and management practices involving major research equipment and facilities construction.

We want to reassure the Subcommittee that NSF is fully committed to the highest standards of financial management and integrity, and to the most transparent methods of tracking and accounting for costs. We are extremely proud of our record and of the confidence that Congress has shown in our ability to support the nation's basic research enterprise. And we are looking forward to presenting you in the near future with our revised guidelines for management of major research facility projects along with summarizing and displaying comprehensively the costs of all our large projects.

Moreover, we wish to emphasize that, although we disagree with many of the statements made in the audit report, we are determined to continue to work closely with the Office of the Inspector General. We may not always reach the same conclusions. But we have the same goal: namely, ensuring that taxpayers' money is invested wisely and well in the kind of science and engineering research and education efforts that America needs for a secure and prosperous future.

Sincerely,

A handwritten signature in black ink that reads 'Rita R. Colwell'.

Rita R. Colwell  
Director

cc: Honorable Christopher Bond



OFFICE OF BUDGET, FINANCE & AWARD MANAGEMENT

**MEMORANDUM**

Date: June 14, 2002

To: Deborah H. Cureton  
Associate Inspector General for Audit  
Office of the Inspector General

From: Richard E. Hastings *R.E. Hastings*  
Deputy Director for Management, Operations, and Policy  
Office of Budget, Finance, and Award Management

Subject: Agency Response to Audit of Funding for Major Research Equipment  
and Facilities, OIG Report #02-2007

The National Science Foundation has completed its review of your May 1, 2002 "Audit of Funding for Major Research Equipment and Facilities," OIG Report #02-2007 ("Audit Report"). An Overview (Attachment A) directly addresses several overarching issues raised by the Audit Report. A comprehensive, point-by-point response to the Audit Report's assertions follows in Attachment B. Together with the interim response to the draft Audit Report contained in Appendix B of the final Audit Report, these constitute NSF's final agency response.

As we have stated previously, notably in Director Colwell's May 17, 2002 letter to the Chair and Ranking Member of the Senate VA/HUD Appropriations Subcommittee, NSF remains committed to working with your office on the Audit Report's recommendations.

Attachments:

- Attachment A: Overview
- Attachment B: Audit of Funding for Major Research Equipment and Facilities  
Results of Audit/Recommendations
- Attachment C: Facilities Funded through the Major Research Equipment and  
Facilities Construction Account

**OVERVIEW****Agency Response to Audit of Funding for Major Research Equipment and Facilities  
OIG Report #02-2007  
June 14, 2002**

It is important to note at the outset that the National Science Foundation (“NSF”) is already acting to implement the general recommendations of the Audit Report -- especially in the area of improved accounting and financial management procedures for large facility development, and in provision of comprehensive training for all NSF personnel involved with those procedures. In addition, we note that much of the disagreement between NSF management and the OIG involves two broad definitional issues that have, to some degree, been obviated by recent Congressional action, by NSF’s own development of detailed guidelines for managing large facilities projects, and by NSF’s creation of a new format for displaying project expenditures.

The first definitional issue centers on what the audit report characterizes as a lack of “consistency” in the sorts of expenditures made from each of three different NSF accounts for various aspects of a project’s development. The guidelines for these expenditures have evolved over the past seven years in response to Congressional guidance, OIG recommendations and NSF internal practices. NSF has, in all cases, carefully adhered to the rules and policies in effect at the time; it is understandable that those actions could appear inconsistent in retrospect.

Congress provided new guidance in its FY 2002 House Conference Report, stating its intent that expenditures from the NSF Major Research Equipment and Facilities Construction account (MREFC) are to be used only for acquisition, construction and commissioning, and that expenditures from the Research and Related Activities account (R&RA) are to cover planning, design, operations and maintenance.

Thanks to this guidance, it appears that the kinds of disagreements NSF has with the Audit Report will occur less frequently in the future. Nonetheless, Congress wisely left a measure of flexibility in its definitions. So there will always be room for argument in some cases because of NSF’s responsibility to support the creation of cutting-edge, one-of-a-kind facilities, instruments and other equipment for which there is often little or no precedent, and for which “standard practice” may not exist. Therefore, NSF will continue to keep Congress informed of the plans, progress, and new developments for MREFC projects.

The second major issue revolves around NSF’s methods of accurately and fully tracking the total cost of any large project. The fact that NSF can readily determine such costs is not in dispute. Rather, OIG and NSF management disagree about the form that the information should take. Here, too, NSF is taking steps to improve its practices. Congress has instructed the Foundation to provide total life-cycle cost information for each of its MREFC projects. NSF has done so and plans to continue to make such information available.

NSF takes very seriously its obligation to manage federal funds in a manner consistent with Congressional intent and the public trust. The Audit Report repeatedly asserts we have failed to fulfill that obligation.<sup>1</sup> NSF management disagrees with those assertions as well as the Audit Report's conclusion.

### Transparency

The Audit Report's assertion that NSF's "accounting system" tracks "only those costs funded from the Major Research Equipment ("MRE") appropriation and not the total cost of the major research equipment and facilities projects" indicates a fundamental difference of view between OIG and NSF management. NSF records and accounts for every expenditure. The total costs of all projects funded by NSF – including major research equipment and facilities – are made available to all decision-makers. To suggest otherwise is simply not supported by the facts. (See pages 1-8 of Attachment B).

NSF's financial management systems provide a critical foundation for reliable financial reporting and accountability. Costs can be aggregated as requested.<sup>2</sup> One can determine the costs – construction or total – of major research equipment and facilities projects by querying our online financial databases and by asking responsible NSF managers. On p. 8, the Audit Report states, "To identify all costs requires a search of NSF award and investigator history databases and interviews of NSF program personnel." OIG and NSF management agree, then, that identifying total costs of major research equipment and facilities *can* be done, but requires interaction with NSF program personnel. This situation does not mean that NSF's financial systems are flawed. Yet, the Audit Report implies that until NSF's *accounting software*, without human analysis and compilation, can produce reports that aggregate and compare costs as requested, OIG will find NSF's "accounting systems" inadequate. We believe this position is unsupported and ignores our demonstrated ability to account fully for all costs associated with major facility projects. (See pages 8 & 9 of Attachment B).

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<sup>1</sup> The report repeatedly asserts that NSF does not track all costs incurred for its major research equipment and facilities (Audit Report, pp. 1, 6, 8, 9, 9, 10, 12, 12, 12) and that NSF financial practices and policies are not adequate to oversee large projects (Audit Report, pp. 1, 6, 7, 7, 10, 10, 12, 13). The report also asserts that NSF's financial policies and practices obscure the true cost of major research equipment and facilities (Audit Report, p. 10). Finally, the report concludes that, NSF "cannot ensure that it stays within its authorized funding limits or that it provides accurate and complete information on the total costs of major research equipment and facilities to decision-makers for use in evaluating performance." (Audit Report, p. 1).

<sup>2</sup> See our February 28, 2002 Report to the Committees on Appropriations on "Facilities Funded Through The Major Research Equipment and Facilities Construction Account," included as Attachment C.

Judgment

Notwithstanding the fact that Congressional guidance on the MRE appropriation and NSF implementing policy have changed over time, NSF has funded MRE projects in accordance with Congressional guidance and NSF policy since the account's inception in FY 1995. The Audit Report's conclusion that a project's true costs are obscured by NSF's financial practices suggests that NSF charges some expenditures to the Research and Related Activities ("R&RA") appropriation or the Education and Human Resources ("EHR") appropriation *to avoid* making additional charges to the MRE appropriation. The implication is that NSF clandestinely supplements the funding of construction projects by wrongfully funding through the R&RA or EHR account costs that are actually construction costs. This conclusion and its implication are misleading and wrongly frame the issue.

With each major project, management must repeatedly exercise judgment in determining how particular expenditures should be funded. For example, on a project-by-project basis, NSF management assesses whether an expenditure should be considered an MRE cost or a cost to be funded from another appropriation. In other words, NSF management assesses whether a cost is a construction cost or is an operational, maintenance, educational, outreach, or another type of cost -- or perhaps some combination of these. NSF management then makes a judgment call and charges the expenditure to a particular account.

The Audit Report makes no allowance for this exercise of judgment. Nor does it allow for the possibility that reasonable minds could differ in their determination of how a particular expenditure should be classified. Rather, an unstated presumption that all pre-operational costs should be charged to the MRE appropriation seems to underlie the Audit Report. The first difficulty with this presumption is that the nature of these projects makes it impossible to identify a particular moment in time when a project moves from pre-operational to operational. The second difficulty is that -- even assuming one *could* identify when a project moves from pre-operational to operational -- it is neither reasonable nor honest to charge all costs "prior to operations" to the MRE account.

For example, the Audit Report asserts that NSF does not have sufficient MRE funds for construction of detectors used at the Large Hadron Collider ("LHC"), and consequently has decided to charge the cost of developing offline computing and software systems for LHC to the R&RA appropriation. The clear implication of the Audit Report is that NSF consciously distorted the so-called total cost of LHC detector construction. It is important to note, here, the difference between data acquisition computing (DAQ) and data analysis software and computing (DASC). Data acquisition software and computing are an essential part of the detector itself, and their costs have been included as a part of detector construction, and therefore are included in NSF's \$81 million contribution to the LHC. DASC is the software and computing utilized post-experiment to analyze and distribute data -- the offline computing systems the Audit Report references. NSF has provided funding out of R&RA to universities to support

development of DASC. These are not construction costs and should not be paid out of MRE. (See pages 3-4 of Attachment B).

NSF management, for argument's sake, does not dismiss the possibility that reasonable minds unfamiliar with the world of high-energy particle physics might differ as to whether the R&D costs for DASC could be considered a construction cost. But the Audit Report leaves no room for judgment or difference of opinion about what should be included as a construction cost and what should be included as an operational or maintenance cost. Instead, the Audit Report asserts, without reference to any specific language or even document, that NSF's \$81 million contribution to the project under the 1997 International Agreement includes the cost of developing offline computing and software systems. The Audit Report then concludes that NSF management ignored some *requirement* that offline computing costs be funded through the MRE appropriation and charges that NSF incurred a 73% "overrun" in LHC construction costs.

A review of the International Agreement by four individuals responsible for interagency management of the LHC program and familiar with the United States Government's responsibility concluded that the Agreement does not reference offline computing. Nor do supplemental governing documents of which we are aware. In light of these governing documents, as well as standard practice (planning for data analysis and distribution is considered an operational cost), NSF was justified in not including development of the offline computing system as an MRE expense. The Audit Report again differs in how it would treat these costs. But it is important to note that absent this disagreement in cost classification, the entire claim of a cost overrun falls. NSF continues to maintain that the MRE expenditure for the LHC includes only the costs of construction and will total \$81 million.

### Consistency

The Audit Report implicitly identifies consistency in "funding practices" as the ultimate value in utilizing the MRE account. Indeed, the Audit Report's conclusion states, "NSF needs to include an upfront process to ensure consistent treatment of costs, such as software development, that are not always clearly classifiable as construction (MREFC-funded) or research (RRA-funded)." (Report, p. 13). The statement itself acknowledges, however, that software development is a cost that could rightly be classified as a construction cost or a research cost, based on the particulars of the software and the project. The results of a process that assigned such costs based on general criteria (whatever those might be) might be consistent but wrong in specific cases. NSF does not subscribe to form over substance. NSF management does not agree with the suggestion that Congress and the taxpayer would be better served by a predetermined, rote classification of costs in place of a reasoned consideration of the particular facts of each situation.

Flexibility

This issue underlies a larger disagreement between our offices. NSF management values agility and flexibility in our policies and practices governing the construction and management of major research equipment and facilities. Experience teaches us that these characteristics are essential to managing well at the frontier. The Audit Report, by contrast, seems to indicate that the exercise of judgment and discretion is actually detrimental to sound financial management. As OIG is aware, we are committed to the development of a transparent management framework, which utilizes general guidelines to ensure reliable financial reporting and accountability while also providing the flexibility needed for each project to extend the frontiers of science and engineering.

Conclusion

NSF remains committed to working with the Office of Inspector General. Regarding this particular report, we hope to gain further clarification on issues where OIG's interpretation of the underlying information differs significantly from ours.

We also look forward to continuing to work toward our shared goal of an NSF investment portfolio that is at once both transparent and accountable, while advancing the best investments in research and education on behalf of the American taxpayer.

**Audit of Funding for Major Research Equipment and Facilities  
Results of Audit / Recommendations**

**Funding and Tracking of Major Research Equipment and Facilities Costs**

OIG

*p. 6*

Although the National Science Foundation (NSF) has worked diligently to provide state-of-the-art major research equipment and facilities<sup>5</sup> and has made a concerted effort to improve its management and oversight of projects receiving funding from the Major Research Equipment (MRE) appropriation account, NSF can improve its financial management of these projects. NSF's policies and practices have changed over time, but do not yet provide adequate guidance for program managers to oversee and manage the financial aspects of major research equipment and facilities. These policies have allowed NSF to use multiple appropriation accounts to fund the acquisition and construction costs of major research equipment and facilities, and led to inconsistencies in the type of costs funded through the MRE account. Additionally, NSF's current practice is to track only those costs funded from the MRE account and not the full cost of the major research equipment and facilities. As a result, NSF cannot ensure that it stays within its authorized funding limits or that it provides accurate and complete information on the total costs of major research equipment and facilities to decision-makers for use in evaluating performance.

[Footnote omitted]

NSF

We appreciate the Office of Inspector General's (OIG) acknowledgment of our efforts to improve management and oversight of major projects. We agree that we can continue to improve financial management and accounting policies and procedures and that associated training be provided all NSF personnel.

We believe that NSF's use of Major Research Equipment and Facilities Construction (MREFC)<sup>1</sup> funds has been consistent with the purposes for which appropriations were made. Prior to the clarification of legislative intent provided in the Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 2002 (115 Stat. 651, 692) and accompanying Conference Report (H.Rep.107-272, p.172), use of multiple appropriations was not prohibited.

The Foundation provides management and oversight bodies with all information requested. And we will provide costs in accordance with the request for "a detailed priority based description, multi-year budget, and milestone plan for all projects funded or proposed to be funded through the MREFC account" (Conference Report, H.Rep.107-272, p.172).

<sup>1</sup> Formerly Major Research Equipment (MRE)

*pp. 7-8*

Since the inception of the MRE account, NSF's policies for using this account to fund the costs of major research equipment and facilities have been inconsistent with the purpose of the account. When NSF established the MRE appropriation account in fiscal year 1995, the stated purpose of the account was to fund the acquisition and construction of major research equipment and facilities. However, NSF's implementing policies and procedures did not reflect this purpose. Rather, NSF's initial MRE Guidelines, as well as its 1997 revision to the Guidelines, stated that cost overruns would not be funded from the MRE account. As a result, funds from other appropriations, such as the Research and Related Activities (RRA) or the Education and Human Resources (EHR) accounts, could be used to fund acquisition and construction costs of major research equipment and facilities, when additional funding was needed.

In addition, MRE funds could be used to fund none, some, or all of a facility's pre-construction costs depending upon when a facility was approved for MRE funding. For example, the initial version of the Guidelines allowed all costs to be funded from the MRE account once a project received MRE status. However, the 2001 revision allowed only approved research and development costs, in addition to the costs of construction. Over time, these policies allowed and contributed to inconsistent funding practices.

At the same time, NSF's accounting system did not, and currently does not, track all costs incurred for its major research equipment and facilities. Instead, NSF generally tracks only those costs

It is unclear what OIG means by "authorized funding limits", but NSF management has had no problem observing the spending limits imposed by appropriations law and National Science Board directives.

NSF's policies and procedures have been refined over time to incorporate lessons learned. These policies and procedures, the refinements, and the use of the appropriations, have been disclosed to all interested parties. In addition, it is important to note all MREFC projects have been funded consistent with the guidelines in place at the time of award approval, and costs charged to them have been consistent with the project proposal, as approved by NSF and the NSB, and as presented in OMB and Congressional budget justifications.

The claim that "NSF's accounting system did not, and currently does not, track all costs incurred for its major research equipment and facilities" is unsupported. Every dollar spent is recorded and, as demonstrated by NSF's February 28, 2002 report to the Committees on Appropriations, can be aggregated as requested.

funded from the MRE account. Costs funded from other appropriations, such as the RRA or the EHR accounts, do not get charged or tracked to the major research equipment or facility. As such, NSF's total contribution to the major equipment or facility is not easily known. To identify all costs requires a search of NSF's award and investigator history databases and interviews of NSF program personnel. Even then, one cannot be sure of identifying all costs of a particular project.

The following cases demonstrate difficulties NSF faces in identifying the financial costs of its major research equipment and facilities projects:

*pp. 8-9 Large Hadron Collider*

The Large Hadron Collider (LHC) is a major research equipment and facilities project for the construction of two high-energy particle detectors, A Toroidal Large Angle Spectrometer (ATLAS) and the Compact Muon Spectrometer (CMS). These detectors will be the major data collecting instruments at the LHC facility at the CERN laboratory in Switzerland. They are scheduled to become operational starting in 2006.

Under a 1997 international agreement, the US Department of Energy and NSF agreed to participate in LHC activities, with NSF contributing financial support, not to exceed the National Science Board (NSB) authorized amount of \$81 million over 10 years, to the US ATLAS and CMS Collaborations. The agreement specified the support was for responsibilities described in the Experiments Protocol, and incorporated Memoranda of Understanding to be carried out during the construction of the ATLAS and CMS detectors. This included responsibilities for the development of the detectors' offline computing and software

Specific comments on each of the four projects discussed in the Audit Report follow.

An understanding of NSF's role in the LHC project provides important context for our discussion. LHC is a \$6 billion project. The U.S. share, supported by DOE and NSF, is \$531 million. The construction components supported by NSF total \$81 million. OIG's interpretation of the scope of NSF responsibilities under the 1997 international agreement is mistaken. The \$81 million in MREFC funding designated for LHC will fully fund NSF's commitment under the agreement, which is to share the cost of constructing the ATLAS and CMS detectors. Data *acquisition* computing at the European Organization for Nuclear Research (CERN) is clearly included in the international agreements on LHC construction. Offline computing and software systems (for data *analysis* and computing by US institutions undertaking research on LHC data) are clearly not included. Rather, as is typical for large-scale physics projects, the costs of planning for data analysis and distribution were anticipated as operational expenses. Thus, NSF's commitment under the agreements will be fully funded by the \$81 million MREFC appropriation.

systems. NSF is funding the entire \$81 million through the MRE account, and is providing the funds through awards to two universities, under which each university leads a group of participating institutions.

In order to meet its commitment under the 1997 agreement, the project will require additional funds. However, without sufficient MRE funds, NSF plans to cover the additional costs with RRA funds; it has already provided over \$2 million in RRA funds for software development. Additionally, NSF is currently considering proposals for an additional \$57 million for software development, detector installation and commissioning, computing infrastructure for researchers, and other pre-operational costs and is planning to fund these costs through the RRA account.

Finally, NSF has been providing additional RRA funding directly to participating universities for "base program support," as well as specific research and development costs in support of the LHC project. Since NSF's accounting system tracks only the costs reflected in the MRE account as the total cost of the project, these additional RRA costs are not recognized as part of this project. NSF's contribution to the LHC Construction will total at least \$140 million; 73 percent greater than the \$81 million currently funded by the MRE account.

*p. 9 George E. Brown, Jr., Network for Earthquake Engineering Simulation (NEES)*

In November 1998, the George E. Brown, Jr., Network for Earthquake Engineering Simulation (NEES) received NSF approval for \$81.9 million to provide a national, networked collaboratory of geographically distributed, shared use, experimental research

The Audit Report seems to have extrapolated a projected 73% construction cost overrun from NSF's current receipt of approximately \$57 million in proposals for LHC-related activities. It is true that over \$2 million in R&RA funds have already been expended for offline software and computing. NSF anticipates additional support through the R&RA account for LHC operations. This information was included in our February report. These R&RA contributions to LHC operations are outside the scope of NSF's commitment to construction under the international agreement.

Base program support for research and education activities may occur before, during and after the life of a construction project. This merit-reviewed research supports scientists and students to work on ideas relevant to the project, or on new ways to exploit the discovery potential of the project. These research activities are not part of the construction project or its deliverables.

NEES obligations in the amount of \$82.9 million (\$81.8 million from MREFC appropriations and \$1.1 million from EHR) were also included in NSF's February report and in the Foundation's FY 2003 Budget Request to Congress. The funds are accurately

equipment sites, with teleobservation and teleoperation capabilities. NSF is funding these costs from the MRE account.

However, in addition to the MRE funding, NSF also provided \$1.1 million in co-funding from its Education and Human Resources (EHR) appropriation, through the Experimental Program to Stimulate Competitive Research (EPSCOR) Program. While the awardee was located in an EPSCOR designated state, and therefore, was properly eligible for EPSCOR funding, NSF provided these funds for the primary purpose of acquiring and constructing earthquake simulation equipment. Also, NSF's financial management system accounted for the co-funding as part of the EPSCOR program and as a result, the system does not identify the co-funding as part of the total costs. Therefore, although the NSB approved NEES project is \$81.9 million and the accounting system will report this amount, the actual total cost of the project will be at least \$83 million.

*pp. 9-10 Polar Support Aircraft Upgrades*

The Polar Support Aircraft Upgrades is a major research equipment and facilities project to upgrade and modify three NSF-owned aircraft to meet Air Force safety and operability standards.

When the project began in FY 1998, NSF provided funding from the RRA account to fund engineering and other costs so it could begin the replacement and modification of major parts and systems of the three LC-130 aircraft. However, NSF's accounting system did not track this funding and as a result, NSF has reported different amounts on the cost of this initial work. Documentation submitted to the National Science Board has reported \$4.3 million in RRA funding, while budget documentation has reported only \$4 million.

recorded and easily accessible in NSF's financial system. The NEES and EPSCoR programs jointly funded this award to foster integration of EPSCoR activities into other forefront science and engineering activities, thereby enhancing broad geographical participation. Simultaneously achieving the objects of two programs (with separate appropriations) does present an accounting challenge for which there is no automatic solution. Recording the \$1.1 million solely under NEES would have understated NSF spending on EPSCoR activities. Reporting it for both programs would distort spending totals. In situations such as this, NSF exercises judgment based on all available information and makes a determination.

The "Polar Support Aircraft Upgrades" MREFC project was for the purpose of modifying and upgrading three NSF-owned LC-130's to meet Air Force safety and operability standards which differ from those of the previous U.S. Navy operators. An FY 1999 \$20 million MREFC appropriation provided funding for the modification of two LC-130s. The necessary modifications for the two planes were identified by the Air Force. Rewinging for the two aircraft was not identified as a necessary modification. An additional \$12 million was appropriated in FY 2000 to add modifications for a third aircraft to the project. The necessary modifications identified for this third aircraft by the Air Force included rewinging.

NSF also used two appropriations to fund this project, even though the nature of the work performed was the same for all three aircraft. In FY 1999 and 2000, the project received MRE funding totaling of \$32 million to modify and upgrade the aircraft, including engineering, which NSF funded from the MRE account. Then, in FY 2002, the project obtained additional MRE funding of \$885,000, for technical documentation and program management.

NSF will also be using additional funding to complete the upgrade of the aircraft. The initial project included replacing the wings of one aircraft, which was funded through the MRE account. However, after the project had begun, the Air Force informed NSF that the other two aircraft also needed wing replacements. NSF is planning to use approximately \$1 million of RRA funds to cover these modifications, although the tasks and purpose of replacing the wings of the three aircraft are the same.

In parallel with and in addition to the Navy-to-Air Force conversion NSF initiated “programmed (i.e. routine) depot maintenance” on the first two aircraft to keep them in good repair. In March 2001, during programmed depot maintenance for the first two aircraft, the Air Force identified the need to replace their wings. Because this rewinging had not initially been identified as a necessary modification, it was not included in the MREFC project.

NSF management then faced the decision of whether to fund the rewinging from MREFC or R&RA. Management weighed the following factors and made what it believed was the best decision: 1) rewinging for the two aircraft was not included in the MRE project; 2) the need for the rewinging was identified in the course of routine depot maintenance of the planes; 3) maintenance costs for the planes are funded out of R&RA. Ultimately, NSF management did not believe funding the unanticipated rewinging from the MREFC account was justified. Management elected to fund the cost from R&RA.

In cases where additional MREFC funds are required, NSF requests approval as appropriate. For example, in May 2001, the Office of Polar Programs advised the members of the National Science Board Committee on Programs and Plans (“CPP”) that it would seek reprogramming authority for \$.791 million to cover a cost variance in the project. The reprogramming request was necessary because actual costs for technical publications and several other project activities exceeded initial cost estimates made by the Air Force. Our Congressional appropriations committees approved reprogramming up to \$1 million.

This action demonstrated OPP’s process for seeking adjustment of an MREFC spending limit when actual costs exceed original estimates. That process was not appropriate for funding the

rewinging for the two planes, as rewinging was not included in the MREFC project costs.

The cost allocation task, then, is not always as simple as your report suggests. Often, management must balance a variety of conflicting factors in seeking to make a decision that comports with Congressional intent and NSF policies.

NSF's February report explains that rewinging of the two aircraft is being funded out of R&RA, not out of the MREFC account. NSF management understands that the OIG, if in management's shoes at the time of the decision, would have made a different call and funded the rewinging from the MREFC account. But, given the facts of the situation, the transparency of our decision, and its funding consequences, NSF management is unable to identify the "wrong" of our decision.

With respect to activities funded through the R&RA account prior to MREFC funding for the Polar Aircraft Upgrades, we note that the \$4 million figure reported in Foundation budget requests was rounded down from the \$4.3 million specified in the initial interagency agreement with the Air National Guard.

*p. 10 Atacama Large Millimeter Array (ALMA)*

The Atacama Large Millimeter Array (ALMA) is a major research equipment and facilities project for the world's most sensitive, highest resolution, millimeter wavelength telescope. The project was planned to consist of forty 8-meter diameter radio telescopes. However, with the formation of a U.S.-European partnership, the planned facility has expanded to sixty-four 12-meter diameter antennas.

NSF, National Science Board and Congressional intent clearly supported funding the design and development phase of ALMA through the MREFC account. The design and development phase was to provide for the achievement of specific goals: a refined and audited cost estimate; site selection; development of an international partnership; and procurement of two prototype antennae. These goals were clear at the beginning of the project

Funding for ALMA has not been consistent with funding practices for other MRE-funded projects. Unlike the others, the initial approval for ALMA was not for construction work. Rather, NSF requested and received Congressional approval for MRE funding of the project's design and development costs. From FY 1998 through FY 2001, this project received \$32 million of MRE funds, solely for design and development.

As a result of these types of inconsistencies in NSF's policies, guidelines, and practices for funding and tracking costs of major research equipment and facilities, one cannot examine the MRE account and determine the total construction costs of these projects with any accuracy. Readily identifying the full cost that NSF's different appropriations paid for these projects is also difficult. Without consistent policies for charging specific appropriations for major research equipment and facilities costs, or complete information on the total costs of these projects, NSF has limited ability to manage the financial aspects of its major research equipment and facilities.

### **Effect of Not Accounting for Total Costs of Major Research Equipment and Facilities**

*pp. 10-11*

When information on the costs of major research and facilities is not accurate or complete, decision-makers may not have an adequate basis for their subsequent judgments and actions. Decision-makers, including NSF management, NSB, Congress, and OMB, need cost information for many purposes. For example, when budgeting, cost information is important for estimating the total costs of projects and establishing funding priorities. Once a project budget is set, actual cost information provides feedback that decision-makers can use to control and

and consistent with the MREFC guidelines in effect. They were endorsed by the NSB and supported by Congress through appropriations in the MREFC Account.

NSF has demonstrated that the costs, construction or total, of major research equipment projects can be collected through information available in our online financial databases and from program personnel. We have consistent policies, which allow for the flexibility to effectively manage all aspects of these complex projects. Prescribing detailed and unalterable rules for accounting for all projects would restrict the Foundation's ability to manage the financial aspects of its major research equipment and facilities.

NSF does have accurate and complete information on major facilities costs, and tracks the costs of all awards. Our tracking includes assuring that NSF stays within its funding limits for each appropriations account, as demonstrated by our February report.

Again, it is important to note all MREFC projects have been funded consistent with the MREFC guidelines in place at the time of award approval, and all costs charged to them consistent with

reduce costs, as well as find and avoid waste. Cost information is also an integral part of measuring performance as a basis to evaluate continued funding of a project against other funding opportunities.

However, as indicated in the above examples, NSF has not always been consistent in its practices for funding or tracking major research equipment and facilities costs. This lack of consistency has resulted in obscuring the true cost of major research equipment and facilities. Tracking only the acquisition and construction costs paid for with MRE funds fails to recognize the costs of the project funded from other sources. It can also provide decision-makers with incomplete information regarding the amount of funds needed to complete the acquisition and construction of major research equipment and facilities, as well as the costs needed to operate and maintain the equipment and facilities.

The consequences of these practices are that other educational and research-funding opportunities are missed and could result in the nature of the activities supported by each Directorate's budget being distorted. In particular, the EHR and RRA appropriation accounts are intended to improve education and human resource development, as well as fund research activities that spur new knowledge, increase understanding, and offer increased opportunities for economic growth. However, when funding for the acquisition and construction of major research equipment and facilities comes from other appropriations, NSF misses opportunities to fund awards in support of these other appropriations' goals. In addition, the nature of the activities supported by each Directorate's budget can become distorted when it is used to fund major acquisition and construction, rather than its intended mission.

the project proposal, as approved by NSF and the NSB, and as presented in OMB and Congressional budget justifications. Differences between projects and over time have occurred as our policies have been refined over time to incorporate lessons learned or to respond to OIG recommendations.

NSF does not agree that other educational or funding opportunities are missed as a result of "inconsistent funding practices", or that the nature of each Directorate's activities are being distorted. Each appropriations account is used for its intended purpose, and NSF program officers must, on a daily basis, choose between competing proposals for funding.

## MRE Appropriation Account Funds Both Critical Assets and Research Tools

*p. 11*

The MRE account provides funding for two distinctly different types of projects: those that invest in state-of-the-art, scientific tools for research and development of new knowledge and ideas; and those that support the investment in mission critical property, plant and equipment (PP&E), owned by NSF, that provide the facilities and logistical means for a broad range of science to take place, primarily in NSF's Polar Programs. Both of these types of projects require good project management (i.e., planning, budgeting, construction, and risk management) to ensure that these multimillion-dollar projects are on schedule, within budget, and perform as expected. Both types of projects require total cost accounting in accordance with the Statement of Federal Financial Accounting Standards (SFFAS) No. 4: Managerial Cost Accounting Standards. But funding both of these types of projects from one appropriation account creates a situation where the replacement, renovation, and upkeep of assets critical to the safety and health of researchers could potentially compete for limited funding with new and improved scientific tools. As such, NSF may want to consider prioritizing the mission critical PP&E projects separately from the development and construction of research tools, as well as differentiating their funding source, to avoid any possible negative impact on the broad range of programs these assets support.

NSF's MREFC panel, chaired by the Deputy Director of NSF, is responsible for reviewing and recommending new major facilities projects for NSF and NSB approval and eventual inclusion in budget requests. In making these recommendations, this panel assesses the relative priorities of each project under consideration. NSF management believes this integrated assessment of competing priorities better serves the Foundation's mission.

## Financial Management Policies and Procedures Need To Be Improved

*pp. 11-12*

Although NSF has funded large science facilities in the past, in recent years, NSF's portfolio of facilities has grown and diversified to include distributed projects that challenge traditional management and oversight approaches. Emerging multidisciplinary science and engineering opportunities have also resulted in NSF moving towards funding a greater number of large facilities projects that are increasingly complex, and present challenging technical and management issues.

However, to date, NSF has not fully developed the policies and procedures needed to oversee and manage the financial aspects of major research equipment and facilities. The majority of NSF awards are relatively small - traditionally funding small, single-investigator projects averaging approximately \$100,000 over a limited period of time. NSF's financial management policies and procedures appear to be geared toward these small awards rather than to the large facilities.

Currently, NSF's policy for major research equipment and facilities projects is the "Guidelines for Planning and Managing the Major Research Equipment Account." These Guidelines address only the MRE appropriation account, and not the full funding for the major research equipment and facilities. Also, the Guidelines recommend only a single financial review during the life of a project and do not provide any guidance on how to perform that financial review. A single financial review of the project is insufficient to ensure that costs incurred to date, as well as estimated future costs, are within the funding types and levels authorized, and may preclude additional funding requests from being considered in the annual budget cycle. The current MRE

As OIG is aware, the Foundation has invested significant efforts to improve financial management and accounting policies and procedures for all large facility projects and expects to have revised guidelines and procedures in place by the end of this fiscal year. Although we hesitate to take time discussing our soon-to-be-replaced rules, we must rebut the implication that our current management is inadequate.

While the current MREFC guidelines recommend a single financial review during the life of the project, the OIG report does not mention the other financial management tools that the Foundation regularly employs in the oversight of its large facilities projects, including:

- Annual GPRA reporting requirements
- Terms and conditions of the cooperative agreements and contracts governing MREFC projects that require regular reporting of actual costs incurred compared to budgeted costs
- The requirement for MREFC awardees to have annual OMB Circular A-133 audits conducted
- NSF OIG or other Federal audit organizations conducting project-specific audits as needed.
- Finally, the working group for large facility projects, charged in late November 2001, is currently completing guidance on the content and frequency for conducting project oversight.

Guidelines also do not address how NSF is to handle cost overruns. While earlier versions of the Guidelines stated that cost overruns should be funded through non-MRE accounts, the current Guidelines are silent on the issue of handling potential and actual cost overruns and provide no direction to NSF project managers.

*pp. 12-13*

Additionally, NSF's policies and procedures do not require tracking NSF's total investment in the major research equipment and facilities. Federal accounting and management guidance requires that the full cost of major research equipment and facilities be tracked, from the planning stage through operations and maintenance. For its major PP&E projects, NSF should include full costs, including operations, in its financial reports in accordance with Federal accounting standards. For those major research equipment and facilities tools funded by NSF, but held by colleges, universities and other entities, NSF should report the full costs as a supplemental part of its financial reporting. According to NSF financial personnel, NSF's financial system has the capability to identify and track the full costs of major research equipment and facilities. Currently, however, NSF's policies do not address accounting for the full cost of major research equipment and facilities and, accordingly, has contributed to the current practice of recognizing only costs funded by the MRE account as the costs of these projects.

Funding arrangements might include contributions from foreign entities, other Federal agencies, and private parties. Thus, contingency planning, including solutions for cost overruns, should be crafted on a case-by-case basis. This involves the participation of our funding partners and the NSF staff familiar with the financial, legal, and legislative intricacies of the project.

NSF policies and procedures enable the tracking of NSF's total investment in major research equipment and facilities. NSF has extensive written guidance for business and scientific staff governing awards management activities, including proposal processing, award approval and issuance, and cost tracking. These practices are found in a number of NSF policy documents: the Proposal and Award Manual, the Grant Policy Manual, Division of Grants and Agreements Standing Operating Guidance (SOG), the Grant Proposal Guide, and NSF Bulletins. Recent specific guidance that enhances our ability to track total costs of MREFC projects supported by multiple appropriations is contained in SOG #2001-2 and NSF Bulletin 01-15 (both dated July 3, 2001). Additionally, the guidelines for managing and overseeing large facility projects will address the tracking of these investments.

The statement that NSF's financial reports are not in accordance with Federal Accounting property standards for Major PP&E projects is unsupported and inaccurate. NSF records all PP&E for which we have direct management and oversight responsibilities in accordance with federal accounting standards. NSF has received an unqualified "Clean" audit opinion since FY 1998 when we resolved this PP&E issue.

Based on a ruling received from the Financial Accounting Standards Advisory Board (FASAB), NSF has, since FY 1998, included reversionary interest PP&E in its Supplemental

To address some of these issues, Congress indicated in its FY 2002 House Conference Report, that NSF should make changes to the MRE account. First, as mentioned earlier, Congress changed the name of the account to the Major Research Equipment and Facilities Construction (MREFC) to better reflect the purpose, activities, and costs to be funded with the appropriations made available through this account. In addition, Congress clarified the use of funds from MREFC account and the RRA account by indicating that the MREFC account is to provide resources for the acquisition, construction, and commissioning of large scale research equipment and facilities and the RRA account is to fund planning, design, operations, and maintenance costs.

This Congressional guidance not only defines how the appropriations should be used to fund major research equipment and facilities, but also determines when projects will be eligible to receive MREFC funding. Unless a specific exception is granted, MREFC funding is limited to the costs of acquisition, construction, and commissioning, and can no longer be used to

Stewardship investments financial statement as overall investments in research and education. NSF changed its reporting of these PP&E items in its FY 2001 financial statements. This change was in response to a reportable condition presented by the OIG in its FY 2001 audit report that prior approved presentations were now incorrect. NSF changed its disclosure of material amounts held by FFRDCs to the audited footnotes and in its supplemental reporting, as requested. Given the conflicting directions received from FASAB and from the OIG, NSF is in the process of addressing these presentation questions to FASAB to gain clarification. In essence, the recommendations in this report support what NSF has done in its past financial statements, but differ from the most recent recommendations made by OIG's auditors.

Naturally, the Foundation accepts the clarification of the legislative intent as to the use of the Major Research Equipment and Facilities Construction appropriation as part of the evolution of that account and will provide the requested information.

The forthcoming guidelines and procedures for large facility projects will incorporate the guidance received from Congress.

fund planning and design costs as it has in the past. Finally, in addition to defining the funding source, Congress also required that NSF submit a report on the full life-cycle costs of projects funded through the MRE account. To comply with these directives and improve its financial management, NSF will have to review, revise and implement its financial management policies and procedures.

### Recommendations

*p. 14*

1. Continue to improve NSF's financial management and accounting policies and procedures to ensure that NSF manages and oversees the full cost of major research equipment and facilities. These improvements must ensure that NSF:

- Identifies, records and tracks the total costs of the major research equipment and facilities in accordance with Federal accounting and management guidance;

NSF believes it has previously and adequately conveyed its agreement with the OIG's recommendation that NSF continue to improve financial management and accounting policies and procedures for large facility projects and to provide the associated requisite training to all NSF personnel involved in these processes. In accordance with the Action Plan submitted to and approved by the OIG in connection with the audit of the Gemini Project, the Foundation is completing guidelines and procedures which will be implemented effective October 1, 2002. In addition, substantial progress on these and other aspects of the Plan has been made and demonstrated in numerous venues, including to the Business & Operations Advisory Committee, committees of the National Science Board, and the OIG. Additional information related to specific aspects of Recommendation 1 follow.

NSF policies and procedures enable tracking NSF's total investment in major research equipment and facilities construction. The guidelines and procedures for large facility projects will compile in one document all policies and practices that enable this tracking.

## OIG

- Uses good financial management practices to oversee its major research equipment and facilities and awardees, including tracking actual costs and conducting adequate financial reviews throughout the life of the project to ensure that actual costs and estimated future costs are within the funding types and levels authorized;
- Incorporates procedures to specify how potential and actual cost overruns are to be handled and subsequent funding approved; and

2. Provide training on the updated policies and procedures to all NSF personnel involved with the funding and accounting of major research equipment and facilities including program management in the sponsoring Offices and Directorates and the Office of Budget, Finance and Award management.

## NSF

The working group for large facility projects, chartered in late November 2001, is currently completing guidance on the content and frequency for conducting project oversight.

The guidelines and procedures address this issue by recommending that each project's cost, schedule and performance goals be rebaselined at least mid-way through the project period (more often if circumstances indicate that this exercise is necessary). This will allow NSF to identify instances where additional funds or time will be necessary and will also provide an opportunity to determine the best course of action; e.g., would the project be rescope, would additional funding be sought, etc. NSF management, NSB, OMB and the Congress would be advised of the outcome of the rebaselining exercise and of NSF's plans for dealing with cost and schedule implications. Moreover, NSF annual budget requests would include such information for review and action by the Congress.

NSF has made considerable progress on its plans to provide training for all NSF personnel. In September 2001 we sponsored a Best Practices Workshop, and we have ensured consistent representation on the Project Advisory Teams for each project to act as the vehicle for translating lessons learned on one project to other projects. A Large Facilities Project resource page has been established on the NSF web site at <http://www.nsf.gov/bfa/lfp/start.htm>. We have worked with the NSF Academy to introduce a Project Management curriculum to NSF personnel. Upon completion of the guidelines and procedures, this curriculum will be enhanced to deliver project

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| management and oversight principles using NSF's definitions,  
| policies and procedures. The guidelines and procedures  
| themselves will be a training tool for NSF personnel and NSF  
| awardees to convey NSF's expectations for sound project  
| management and oversight.