National Science Foundation • Office of Inspector General
4201 Wilson Boulevard, Suite I-1135, Arlington, Virginia 22230

ALERT MEMORANDUM

DATE: December 10, 2015

TO: Ms. Martha A. Rubenstein
Office Head and Chief Financial Officer
Office of Budget, Finance, and Award Management

Dr. F. Fleming Crim
Assistant Director
Directorate for Mathematical and Physical Sciences (MPS)

FROM: Dr. Brett M. Baker
Assistant Inspector

SUBJECT: **NSF's Oversight of the Large Synoptic Survey Telescope Construction Project, Report # 16-3-001**

The Large Synoptic Survey Telescope (LSST) project was awarded in August 2014 with National Science Board (NSB)-capped total funding of $473 million and is being constructed in Chile under a cooperative agreement with the Association of Universities for Research in Astronomy, Inc. (AURA). The purpose of this memo is to bring to your attention potential cost and schedule risks to the LSST project. At this point, NSF can make necessary corrections and improve its ability to ensure that it has the financial and project information it needs to adequately oversee the LSST project and to ensure that federal funds invested in scientific research are spent responsibly and limit potential scientific losses. Such actions could reduce the likelihood of a potential cost overrun, limit loss of scientific capability from de-scoping under the National Science Foundation (the Foundation)'s "No Cost Overrun" policy, decrease the risk of unallowable costs being charged to the award and reduce schedule delays.[1]

In addition, as described below, a 2014 financial assessment of AURA, which is managing LSST, noted concerns with several key indicators that rate financial capability. Given the fact that AURA manages 16 NSF awards, worth a total of $1.35 billion, these concerns are troubling and should be addressed by the Foundation.

[1] This review was conducted in accordance with the Quality Standards for Inspection and Evaluation. Inspection steps included interviewing NSF staff, reviewing previous audit reports, and reviewing NSF documents.

Need for Improved Information Concerning Award Expenditures

As part of this review, we examined documents created by NSF's Cost Analysis and Audit Resolution Branch (CAAR) as well as monthly project reports submitted to NSF. CAAR identified several areas of concern including the complexity of the project's indirect cost rate and challenges arising from the fact that the bulk of the project is being overseen in Chile. We also noted problems with the level of detail in monthly project reports. The specific issues identified are described below.

Although only $44 million of LSST project funds had been spent as of October 16, 2015, CAAR identified several areas of concern during AURA's indirect cost rate negotiations. In its indirect negotiations for fiscal year (FY) 2014, CAAR stated that AURA's indirect cost rate structure was very complicated. This could make errors more likely and lead to overcharges to the government.

As part of its activities, CAAR also requested that AURA provide general ledger details for all costs incurred in approximately 20 expense categories considered most likely to include potentially unallowable costs. CAAR's review of this documentation identified several instances in which the cost of conference meals exceeded the maximum allowable per diem. Also, CAAR requested more robust source documentation from AURA to support charges for facility usage rates, but was informed by AURA that "no document exists." Accordingly, CAAR recommended that AURA secure more robust documentation to support these charges. CAAR also expressed concern with the fact that the AURA corporate office did not appear to have a leading role in oversight and approval of corporate expenses. CAAR noted that this could potentially constitute an internal control weakness in AURA's expenditure monitoring process.

In light of the foregoing, CAAR officials stated that an incurred cost audit of the LSST project each year, or at least every other year, would be beneficial to ensure that awardees, including AURA, are not overcharging NSF for indirect costs.[2] CAAR stated that such reviews would identify misallocations of indirect costs or inequitable indirect rates.

In 2015, the grants officer recommended that LSST receive an incurred cost audit. CAAR and the program officer also agreed that an incurred cost audit of the first year is warranted. In its response to our draft report, NSF stated that it is pursuing an incurred cost audit in 2016. The agency indicated that initiation of the audit is pending NSF's procurement of audit services to perform the review.

There is a heightened risk to the project because LSST is being constructed in Chile. NSF's review of Chilean expenditures selected for sampling found that supporting documentation provided was solely in Spanish, which made oversight of such expenses more difficult. Despite multiple requests, AURA was unable to provide a justification in English for most expenses

[2] NSF's new procedures for its large facility projects state that the agency will conduct incurred cost audits at project completion or as warranted based on annual risk assessments conducted by NSF.

sampled. To ensure that expenditures are allowable and warranted, it is essential to have clear support. Given the challenges posed by the fact that the project is being constructed in Chile, regular site visits can also help identify project management and execution issues, as evidenced by the recent NSF site visits to the National Ecological Observatory Network (NEON). In our discussions with NSF officials, we were informed that there was interest in conducting a site visit, but one had not yet been planned.

In its response to our draft report, NSF agreed that it is important for financial records to be in English for proper review by auditors and NSF staff. NSF indicated that it is amending AURA's award-specific terms and conditions now that the new Office of Management and Budget's *Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards* considers costs of translation as allowable costs.

NSF OIG reviews of NSF's management of its large facility projects have noted that NSF does not normally receive transaction level detail for expenditures for these projects. With respect to LSST, NSF staff confirmed that NSF does not collect invoices for costs for cooperative agreements, including LSST. NSF receives monthly project reports on LSST, but the cost information in these reports is at a high level for earned value management purposes and does not include transaction level detail. The monthly reports list the amount spent for each subcontract/subaward, but do not include detailed data, support, or analysis for expenditures under them. Subcontracts and subawards comprise one of the most significant costs for LSST and lack of support for these costs would constitute a fundamental risk to financial management.

In its response to our draft report, NSF indicated that it is currently developing an award provision and complementary reporting tool to increase cost reporting requirements for large facility construction and operation awards.

LSST Earned Value Management Information Is Not Verified or Validated, Calling Into Question Whether NSF Has Sufficient, Reliable Information to Oversee the Project

NSF receives Earned Value Management (EVM) reports for LSST, which it uses to measure project schedule and costs. However, NSF does not verify the data LSST provides in its EVM reports. The poor quality of the information in EVM reports for the NEON project was one of the reasons why the cost overrun for that project was undetected for so long and demonstrates the importance of having a robust EVM process.[3]

Compounding this concern, we learned that NSF did not certify the EVM system for LSST. Certification of an EVM system, including supporting data, is conducted by the Defense Contract Management Agency to ensure that an awardee maintains an acceptable EVM system, which includes data to support scheduling of work and interim progress measures, among other things. Relying on "trust" that an awardee is providing sound data is not a substitute for an independent assessment of data underlying the system being used to evaluate the project's progress.

[3] *NSF's Management of Potential $80 Million Cost Overrun for NEON, Report #15-3-001.*

Our examination of the thresholds other federal agencies use when determining whether an awardee's EVM system should be certified found that for example, the Health and Human Services requires such certification for projects over $10 million; the General Services Administration for projects over $20 million; and the National Aeronautics and Space Administration for projects over $50 million. The $473 million LSST award far exceeds the threshold other federal agencies use in determining whether certification of the EVM system is warranted.

In its response to our draft report, NSF indicated that it will validate the EVM data for LSST as part of the 2016 annual review process. The agency also indicated that it has begun evaluating the benefits of EVM system certification as a requirement for large scale facilities and mid-scale infrastructure projects and that it is investigating establishing thresholds for EVMS certification on all facilities projects.

Assessment of AURA's Financial Viability Raises Concerns

Two years ago, CAAR decided to start conducting financial viability assessments of AURA as part of its standard review of indirect cost rates. At the time of its fiscal year 2014 financial viability assessment, AURA held 16 active NSF grants and/or cooperative agreements representing total funding of nearly $1.35 billion. CAAR conducted annual financial viability assessments of AURA in FY 2013 and 2014. Both disclosed concerns with key indicators used to assess financial capability.

For example, a strong current ratio generally indicates that an organization is financially viable enough to perform under the terms of the award and adequately safeguard federal funds.

[redacted] CAAR has indicated that it will continue to closely monitor AURA's financial viability. Particularly in light of the declining trend in the FY 2013 and 2014 assessments, we will be closely examining the FY 2015 financial viability assessment, which is expected in April or May 2016.

In its response to our draft report, NSF stated that it is reviewing additional documentation AURA provided about inclusion of certain FY 2014 liabilities in its ratio. NSF informed us that should it accept AURA's reclassification of these liabilities, it is likely that AURA's ratio for FYs 2013 and 2014 will improve.

Other financial viability risks NSF's review identified included the presence of net asset deficiencies, which occur when an organization's liabilities are greater than its assets.

[redacted]

In light of the $1.35 billion in NSF funding that AURA manages, weaknesses in AURA's financial viability raise serious concerns, [redacted]

Conclusion

Although the LSST project is in the early stages of construction, we are providing this memo to NSF because it is not too late for the Foundation to enhance oversight of this project to ensure that potential cost overruns, schedule delays, and other problems are avoided in the future. It is not too late for NSF to ensure that issues similar to those which occurred in the NEON project do not recur in the LSST project.

In its response to our draft report, the Foundation listed many actions that it has taken or plans to take with respect to the issues we identified. We appreciate NSF's current and planned actions. In particular, we agree with CAAR, the program officer, and the grants officer that an incurred cost audit for LSST is warranted. In addition, it is essential for the information in EVM reports to be accurate and complete. It is also important to ensure financial records are translated and understandable.

Advancing and promoting outstanding, cutting-edge science is NSF's primary mission, but NSF is also entrusted with over $27.8 billion of taxpayer dollars for active awards. Accordingly, it is critical for NSF to ensure taxpayer funding is safeguarded and used to advance project goals in a cost effective manner.

Recommendations

In light of the foregoing, we recommend that the NSF Chief Financial Officer and NSF Assistant Director for the Directorate of Mathematical and Physical Sciences take immediate action to improve NSF's oversight of AURA's management of LSST. Such actions should include, but not be limited to, the following:

1. Require annual incurred cost audits of LSST;
2. Obtain certification of AURA's EVM system for LSST and validate EVM data for LSST;
3. Work with AURA and relevant stakeholders to address unfunded liability issues; and
4. Ensure that invoices provided in Spanish be understandable and translated accurately.

Agency Response and OIG Comments

NSF generally agreed in principle with the OIG recommendations and will implement corrective actions. Where appropriate, we have noted the agency's comments in the body of the report. NSF's full response is attached as an appendix.

In accordance with OMB Circular A-50, Audit Follow-up, please provide our office with a written corrective action plan to address the report's recommendations. In addressing the report's recommendations, this corrective action plan should detail specific actions and

associated milestone dates. Please provide the action plan within 60 calendar days of the date of this report.

If you have any questions about this alert memo, please contact me, at 703-292-7100, or email at bmbaker@nsf.gov.

cc: Christina Sarris
Fae Korsmo
Ruth David
Michael Van Woert

National Science Foundation

4201 Wilson Boulevard, Arlington, Virginia 22230

Memorandum

DATE: December 4, 2015

FROM: Ms. Martha A. Rubenstein/s/
Office Head and Chief Financial Officer
Office of Budget, Finance and Award Management

TO: Dr. Brett M. Baker
Assistant Inspector General for Audit
Office of the Inspector General

SUBJECT: NSF's Oversight of the Large Synoptic Survey Telescope Construction Project, Report # 16-3-001

Thank you for allowing NSF the opportunity to provide comments on the subject draft Alert Memorandum. The Large Synoptic Survey Telescope (LSST) currently being constructed in Chile is a $473 million project awarded to the Association of Universities for Research in Astronomy, Inc. (AURA). NSF is dedicated to monitoring and taking needed actions on this project to mitigate any potential cost overruns or changes to the schedule.

NSF understands the difficulties in the management of any large facilities project overseas, but disagrees with the statement that Cost Analysis and Audit Resolution (CAAR) risk assessment described working in Chile as a risk. CAAR also corrects the notion that the indirect cost rate could lead to overcharges. CAAR negotiates AURA's indirect (non-recharge) rates on a provisional-to-final basis, which leads to minimal risk of indirect overcharges and questionable expenditures are removed during the review.

Concerning the recommendation that LSST receive an incurred cost audit. NSF has made additional progress in developing an award provision for obtaining incurred cost information from large facility awardees. Upon Dr. Buckius' acceptance of NSF's plans to pursue incurred cost information, an award provision and financial data collection tool was developed by BFA, and approved by the CFO for implementation on September 30, 2015. Currently the provision and data collection tool are receiving final internal approval by BFA, with plans to implement the provision in early calendar year 2016. The Agency has tentatively determined that OMB approval of the award provision will likely not be required.

NSF is pursuing an incurred cost audit of the LSST project in 2016. The risk assessment conducted in FY 2015 resulted in a determination that an incurred cost audit for LSST may be warranted, subject to further analysis. The decision has been subsequently made, in coordination with program, that an incurred cost audit should be conducted in FY 2016. Currently, initiation of the audit is pending NSF's procurement of audit services to perform this review. Consistent with NSF policy, a determination of the need for additional incurred cost audits will be completed through the annual Division of Acquisition and Cooperative Support (DACS) risk assessment process, which is conducted in accordance with Standard Operating Guidance (SOG) 15-6 "Guidance on Pre and Post-award Cost Monitoring Procedures for Large Facility Construction and Operations Awards Administered by CSB."

The draft Alert Memo states that "*NSF staff confirmed that NSF does not collect invoices for costs for cooperative agreements, including LSST.*" NSF is currently developing an award provision and complementary reporting tool to increase cost reporting requirements for large facility construction and

operations awards. This effort has been reported under the NSF FY 2014 Financial Statement Audit under the action item "Complete analysis of cost reporting requirements and make recommendations for cost submissions." The award provision is scheduled for incorporation into impacted NSF awards after the Agency review and approval process is completed.

Regarding AURA's Financial Viability Concerns: In compiling its FY 2014 Financial Viability Assessment, CAAR removed from its current ratio calculation $15.9 million in assets associated with the Dark Energy Camera (DECam) instrument, which is being held by AURA on behalf of NSF and DOE. After CAAR's assessment was released, AURA provided additional documentation to NSF as part of BFA's standard monitoring processes. In this documentation, AURA stated that a corresponding $15.9 million in liabilities associated with DECam had been included within the $26.4 million in FY 2014 liabilities reported under "Amounts Held for Others," and should have been excluded from the current ratio calculation. This liability was not removed in CAAR's calculation of the current ratio; but may also not have been transparently disclosed in AURA's financial statements. This additional documentation received by AURA is currently undergoing further review; should NSF accept AURA's reclassifications, it is likely that the current ratio for FY 2013 and FY 2014 will be above "1.0."

The draft Alert Memo further states that "*LSST Earned Value Management information is not verified or validated, calling into question whether NSF has sufficient, reliable information to oversee the project.*" Currently the Program and the Large Facilities Office (LFO) review of Earned Value Management (EVM) data for all construction projects on a monthly basis. The LFO has begun evaluating the costs and benefits of EVM System certification as a requirement for Large Facilities and mid-scale infrastructure projects. Total project cost thresholds and additional requirements will be benchmarked against other federal funding agencies including DOE and NASA. In the near term, LFO is also working closely with Program to include validation of EVM data as part of the annual construction review for LSST, which is currently planned for February 2016. Based on Panel recommendations, further validation efforts may be undertaken following the review.

Lastly, NSF agrees that it is important for financial records be in English for proper review by auditors and NSF staff. Prior to FY 2015, the costs for translation were not included in the OMB federal regulations and it was not a requirement. The new *Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards* requires federal award information to be in the English language. NSF will amend AURA's award-specific terms and conditions accordingly.

NSF is committed to ensuring taxpayer dollars are protected. Ongoing measures to strengthen oversight of the Large Facilities Program awards will safeguard the project goals in a cost effective manner.

<u>Responses to OIG Recommendations to ensure that NSF improve the oversight of AURA's management of the LSST project:</u>

NSF generally agrees in principle with the OIG recommendations and will implement all necessary and relevant actions prior to receiving the Alert Memo. Agency actions already underway, which also address the OIG recommendations, are described below.

1. **Require annual incurred cost audits of LSST.**

   BFA Response: NSF is pursuing an incurred cost audit of the LSST project in FY 2016. Consistent with NSF policy, a determination of the need for additional incurred cost audits will be completed through the annual DACS risk assessment process, which is conducted in accordance

with Standard Operating Guidance (SOG) 15-6 "Guidance on Pre and Post-award Cost Monitoring Procedures for Large Facility Construction and Operations Awards Administered by CSB."

2. **Obtain validation of AURA's EVM system for LSST and review EVM data for LSST.**

   BFA Response: NSF will validate the EVM data for LSST as part of the 2016 annual review process. NSF is investigating establishing thresholds for EVMS certification on all facilities projects.

3. **Work with AURA and relevant stakeholders to address unfunded liability issues.**

   BFA Response: As of AURA's FY 2014, which ended September 30, 2014, the financial statements disclosed no unfunded liabilities associated with LSST. During the normal course of oversight, NSF will meet with relevant internal stakeholders as well as representatives from AURA to address issues arising during project implementation. NSF believes that the responsibility for these liabilities, particularly to post-retirement liabilities, rests with AURA and not with NSF. Accordingly, no liability is reflected in the NSF financial statements. NSF's legal counsel supports our position on this matter.

4. **Ensure that invoices provided in Spanish be understandable and translated accurately.**

   BFA Response: NSF is pursuing adding new language to the Large Facilities Program, award-specific terms and conditions requiring the translation of federal award documents into English language per new OMB federal regulations 2 CFR 200.111, which allows for funds to be used for translation.