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AUDIT OF THE NATIONAL SPACE BIOMEDICAL RESEARCH INSTITUTE

February 1, 2018

Report No. IG-18-012

Office of Inspector General

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RESULTS IN BRIEF

Audit of the National Space Biomedical Research Institute

February 1, 2018 IG-18-012 (A-17-001-00)

WHY WE PERFORMED THIS REVIEW

The National Space Biomedical Research Institute (NSBRI) was formed in 1997 to partner with NASA, academia, and industry to advance biomedical research focused on long-term human presence in space. Headquartered at the Baylor College of Medicine in Houston and funded through a cooperative agreement with NASA, NSBRI seeks to bridge the gap between the technological and clinical expertise of the biomedical community and the scientific, engineering, and operational expertise of NASA. NSBRI research seeks to develop technologies to enable safe and productive human space flight, including medical monitoring, diagnosis, and treatment in the extreme environments experienced during space exploration missions.

In a June 2016 report, we examined 60 NASA-funded Institutes – including NSBRI – to assess their alignment to NASA's missions, their contributions, and their history and funding profile. Collectively, the 60 institutes received about $800 million from NASA between 2013 and 2015, with 18 of the 60 receiving 95 percent or more of their total funding from the Agency.

In this audit, we examined NASA's management of its 20-year, $484 million cooperative agreement with NSBRI and assess how the group's work contributed to the Agency's approach to conducting biomedical research. Specifically, we examined (1) the extent to which NSBRI met NASA's goals to increase the Agency's knowledge of human physiological responses to space travel; (2) whether NSBRI used NASA cooperative agreement funds for their intended purpose and whether costs paid under the agreement were allowable, reasonable, and in accordance with applicable laws, regulations, and guidelines; and (3) whether alternatives exist for NASA to obtain high quality but less expensive space biomedical research. In meeting these objectives, we reviewed applicable Federal laws, regulations, and guidelines; evaluated Agency and Institute policies and agreements; interviewed officials from NASA, NSBRI, and the Baylor College of Medicine; analyzed the Institute's spending; and obtained relevant documentation.

WHAT WE FOUND

We found that NSBRI delivered research products that helped NASA make progress toward the goal of mitigating human health and performance risks associated with space travel. However, while most NSBRI charges complied with applicable laws and the award's terms, NASA improperly permitted NSBRI to use $7.8 million of research funds to renovate and pay rent for laboratory space in a private building during the final 7 years of its agreement.

Over the years, NSBRI initiatives have enabled the Agency to make progress toward mitigating human health and performance risks associated with space travel. For example, NSBRI-funded science and technology projects in 2016 included a study involving sleep risk that resulted in installation of solid-state lights in the ISS crew sleeping quarters to improve crew sleep patterns and enhance alertness and performance. In addition, NSBRI analyzed astronaut health data regarding spaceflight-induced intracranial pressure vision alterations to help mitigate visual impairment experienced by astronauts during space flight. Other NSBRI-funded research including a new method to use diagnostic ultrasound for early detection of kidney stones has been used to improve life on Earth by applying findings from space-based research to detect health risks.

When the cooperative agreement began in April 1997, NSBRI staff occupied approximately 5,000 square feet of office space in a building owned by the Baylor College of Medicine and Houston Methodist Hospital. In late 2009, NSBRI asked NASA for permission to use cooperative agreement funds to renovate the ninth floor of a separate building owned by Rice University and in June 2010, with 7 years remaining on its 20-year agreement, a NASA contracting officer approved use of $2.9 million for the capital improvement. After the renovation, NSBRI's annual lease expenses rose from about $7,000 to an average of $800,000.

In our judgment, NASA improperly approved NSBRI's request to use cooperative agreement funds to renovate the NSBRI work space. Lacking specific legislative authority, Federal appropriations may not be used for such capital improvements unless the expenditures meet specific Government Accountability Office (GAO) criteria. Moreover, the improvements to the facility primarily benefitted Rice University rather than NASA or the Federal Government. Indeed, at the conclusion of NSBRI's cooperative agreement with NASA in September 2017 possession of the facility renovated at NASA's expense reverted to Rice.

Beginning in September 2016, NASA entered into a $245 million, 12-year cooperative agreement for biomedical research with the Translational Research Institute (TRI) – the successor to NSBRI, a consortium also run by Baylor. NASA decided to continue using the institute model for biomedical research because it believes an external institute is better positioned to identify and attract cutting edge research and technology given the consortium members' extensive expertise and professional networks. We question this rationale, given NASA's increased capabilities in this area since creation of the Agency's Human Research Program (HRP) in 2005 to spearhead the Agency's space biomedical research. In our judgment, NASA should consider leveraging more of HRP's capabilities rather than relying on outside institutes like NSBRI and TRI to identify and manage external researchers for future biomedical research.

WHAT WE RECOMMENDED

We recommended the Johnson Center Director: (1) remedy $2.9 million in cooperative agreement funds improperly authorized to renovate the NSBRI facility; (2) remedy $4.9 million in cooperative agreement funds spent on unreasonable rental costs for the facility post-renovation; and (3) remedy the $41,788 in cooperative agreement funds spent on unreasonable meeting and travel costs. To ensure efficient operations and prevent unnecessary duplication of research and administrative costs, we recommended the Center Director (4) monitor the new cooperative agreement with TRI closely to ensure it leverages existing NASA capabilities and functions in order to efficiently and effectively achieve the Agency's biomedical research goals.

We provided a draft of this report to NASA management for review and comment. Management partially concurred with recommendation 3 and concurred with recommendation 4. For these two recommendations, we considered management's comments responsive; therefore, the recommendations are resolved and will be closed upon completion and verification of the proposed corrective actions.

Agency managers partially concurred with recommendations 1 and 2 but did not agree with our conclusion that NASA should remedy $7.8 million in cooperative agreement research funds spent on what we determined were unreasonable renovation and rental costs.

NASA contends that its Contracting Officer thoroughly evaluated Baylor's renovation proposal and exercised appropriate discretion in authorizing an exception to use of agreement funds for the renovation, but merely failed to adequately document this analysis. However, we believe management's response is an after-the-fact rationalization for an improper decision that, among its shortcomings, fails to address whether the Contracting Officer considered the finding of another NASA Contracting Officer who reviewed a similar NSBRI renovation proposal 3 years earlier and concluded the request was "unallowable."

Consequently, recommendations 1 and 2 are unresolved pending further discussion with the Agency.

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TABLE OF CONTENTS

Acronyms

CAMP	Cooperative Agreement Management Plan
CFR	Code of Federal Regulations
ESMD	Exploration Systems Mission Directorate
GAO	Government Accountability Office
GSA	General Services Administration
HRP	Human Research Program
ICP	intracranial pressure
ISS	International Space Station
LED	light-emitting diode
NSBRI	National Space Biomedical Research Institute
OIG	Office of Inspector General
OLED	organic light-emitting diode
OPM	Office of Personnel Management
TRI	Translational Research Institute

INTRODUCTION

Since its beginnings in 1958, NASA has been at the forefront of science and space exploration, serving as the engine behind numerous scientific discoveries and technological innovations. Over the past 50 years, the Agency has relied on contributions from its civilian and contractor workforce and outside organizations to provide expertise in a wide variety of scientific fields.

In June 2016, the NASA Office of Inspector General (OIG) examined 60 NASA-funded institutes (defined as academic institutions, research entities, and related entities) to assess their alignment to Agency missions, their history and funding profiles, and their contributions to NASA's mission. Collectively, the 60 institutes received an average of about $800 million from NASA between 2013 and 2015, with 18 of the 60 receiving 95 percent or more of their total funding from the Agency.

Included in that review was the National Space Biomedical Research Institute (NSBRI), a research institute formed in 1997 to partner with NASA, academia, and industry to advance biomedical research focused on long-term human presence in space. Headquartered at the Baylor College of Medicine in Houston, Texas, and funded through a cooperative agreement with NASA, NSBRI seeks to bridge the gap between the technological and clinical expertise of the biomedical community and the scientific, engineering, and operational expertise of NASA. NSBRI research focuses on developing technologies to enable safe and productive human space flight, including medical monitoring, diagnosis, and treatment in the extreme environments experienced during space exploration missions.

This audit assesses NASA's management of the NSBRI cooperative agreement and the Agency's overall approach to conducting biomedical research. Specifically, this audit examines (1) the extent to which NSBRI met NASA's goals to increase the Agency's knowledge in the study of human physiological responses to space travel; (2) whether NSBRI used NASA cooperative agreement funds for their intended purpose and whether costs paid under the agreement were allowable, reasonable, and in accordance with applicable laws, regulations, and guidelines; and (3) whether alternatives exist for NASA to obtain high quality but less expensive space biomedical research. See Appendix A for details of the audit's scope and methodology.

Background

In 1996, NASA issued a cooperative agreement notification seeking an organization to lead a national biomedical research effort to support the long-term human presence, development, and exploration of space and to enhance life on Earth by applying advances in human knowledge and technology acquired through living and working in space. The Agency chose the Baylor College of Medicine, which subsequently created NSBRI in 1997; over time, NSBRI evolved into a consortium of 12 institutions.[1]

[1] The initial consortium of 7 academic institutions expanded to 12 in 2000. The institutions are Baylor College of Medicine, Brookhaven National Laboratory, Harvard Medical School, Johns Hopkins University School of Medicine, Massachusetts Institute of Technology, Morehouse School of Medicine, Mount Sinai School of Medicine, Rice University, Texas A&M University, University of Arkansas for Medical Sciences, University of Pennsylvania Health System, and University of Washington.

NSBRI's original cooperative agreement with NASA was for 5½ years with three 5-year options. NASA exercised the final option in April 2012, extending the agreement through September 2017 and bringing its total value over the life of the agreement to $484.2 million, making it one of the Agency's largest cooperative agreements.

From its beginning, NSBRI focused largely on bringing together experts from academia and NASA in the biomedical and scientific and engineering communities to investigate and help mitigate the physiological and performance risks faced by humans during long-duration space flight. Such risks include excessive radiation, the physiological effects of altered gravity, and other unique challenges in medical and behavioral health support. In examining these issues, NSBRI identified experts in the field to conduct specific research through competitive solicitations and alongside NASA civil servants in Agency laboratories. NASA provided NSBRI research funds to distribute on a competitive basis to academia, state governments, and industry using the Agency's solicitation and selection processes. In fiscal year 2015, NSBRI funded approximately 60 institutions in 25 states.

NASA's Human Research Program

NASA established the Human Research Program (HRP) at Johnson Space Center (Johnson) in 2005 to focus the Agency's research investments to investigate and mitigate the highest risks to astronaut health and performance. HRP is responsible for NASA's space flight biomedical research (an assignment previously handled by NSBRI). HRP worked with NSBRI to identify outside individuals and groups to conduct biomedical research but retains ultimate authority over the selection and performance of those research partners. In addition, HRP and NSBRI released joint annual solicitations to academia and industry for research and technology development proposals. HRP also manages the cooperative agreement with NSBRI, with the head of the HRP Program Science Management Office serving as the contract technical officer for the cooperative agreement.

Management of Cooperative Agreements

Government-wide regulations for managing cooperative agreements are set forth in the Code of Federal Regulations (CFR) and are supplemented by NASA regulations. The CFR establishes administrative requirements governing grants and cooperative agreements awarded to educational entities and nonprofit organizations.[2] For example, NSBRI must comply with Federal cost principles with respect to its use of NASA funds and must ensure recipients of any NASA funds comply with Federal requirements that all expenditures are reasonable, allocable, and allowable.

[2] At the time of the initial award, this cooperative agreement was under the authority of 14 CFR part 1260 (Grant and Cooperative Agreements), 2 CFR 220, (Cost Principles for Educational Institutions), and 2 CFR 215, (Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations. The NASA Grant and Cooperative Agreement Manual provides guidance to NASA Technical Officers and Grant Officers for awarding and administering grants and cooperative agreements with educational and nonprofit organizations.

NSBRI Cooperative Agreement Management Plan

In establishing NSBRI, NASA created a Cooperative Agreement Management Plan (CAMP) that laid out the agreement's terms and conditions and detailed how NASA and NSBRI would conduct joint research activities.[3] The CAMP required NSBRI to:

- coordinate with NASA to ensure that expenditures of time, money, facilities, and personnel were worthwhile or required by law, procurement policies, or prudent fiscal stewardship.
- support NASA's integration of the knowledge base relevant to the biomedical response of humans to space flight factors, including risk levels and recommendation for acceptable risk levels for present and future medical risk to human participants;
- adhere to HRP's research plan to develop the required knowledge and technologies across all biomedical and associated technological disciplines to enable long-duration human space flight and countermeasures where required;
- participate in HRP's science management process to support the overall humans in space biomedical research program;
- demonstrate an understanding of the space medicine environment and transfer this understanding to other research teams;
- ensure the dissemination of advances in knowledge gained to the greater scientific community;
- facilitate science community access to NASA's space infrastructure associated with biomedical research;
- promote and provide active collaboration with for-profit entities to ensure that developed technologies were transferred to the private sector; and
- conduct education and public outreach programs consistent with NSBRI's mission and in support of NASA's educational and public outreach objectives.

Translational Research Institute

Anticipating the end of the NSBRI agreement in September 2017, NASA released a competitive solicitation in October 2015 to continue its biomedical research with an outside entity. Six groups responded to the solicitation and in September 2016 NASA awarded a 6-year cooperative agreement with the possibility of one 6-year extension to the Baylor College of Medicine. This time, however, Baylor created a consortium known as the Translational Research Institute (TRI).[4] Total anticipated funding over the 12-year life of the agreement is $245.7 million.

The award justification noted that NASA selected Baylor because of its superior medical expertise, well-defined risk structure, disciplined medical team to conduct basic research, and the lowest overhead costs of the proposals. Like it did with NSBRI, HRP manages the TRI cooperative agreement.

[3] 14 CFR part 1260 (Grant and Cooperative Agreements). According to Federal regulations, the agreement's terms and conditions should be in place before the award is signed.

[4] The TRI consortium members include the California Institute of Technology and the Massachusetts Institute of Technology.

TRI's emphasis is translational research, an interdisciplinary research model that focuses on translating fundamental research concepts into practice with appreciable health outcomes. NSBRI's primary focus had been the identification and mitigation of biomedical risks associated with human space travel based on data collected from astronauts working in space. In contrast, TRI's research is an attempt to take the next step in biomedical research – identifying practical applications and countermeasures to reduce human health and performance risks associated with long duration space exploration missions. These applications may already exist, require modification of commercial-off-the-shelf products, or require development of new technology.

NSBRI Satisfied Program Objectives, but Improperly Used Cooperative Agreement Funds to Renovate Research Facility

We found that NSBRI delivered research products that helped NASA make progress toward the goal of mitigating human health and performance risks associated with space travel. However, while most NSBRI charges complied with applicable laws and the award's terms, NASA improperly permitted NSBRI to use award funds to pay for renovations of its work space, resulting in $7.8 million in excessive facility costs. In addition, for a sample of transactions reviewed, NSBRI overpaid vendors for meals and ground transportation associated with official meetings, compared to the costs for similar services from more reasonable alternative sources.

NSBRI Made Progress Toward the Overall Goals of the Cooperative Agreement

The cooperative agreement required NASA to ensure NSBRI was subject to a comprehensive performance review the third year of each 5-year extension. Commissioned by the NASA Chief Scientist, the external review was conducted by a panel of scientists from the biomedical community, government, and academia. NSBRI was reviewed in 2000, 2005, and 2010 by external panels, with the reviews reporting favorable performance for NSBRI and recommended continuation of the agreement.[5] The reviews also contained several recommendations, including improved collaboration and communication between NASA and NSBRI.

In our October 2015 audit of NASA's efforts to address the risks associated with space exploration, we reported that the work of HRP together with several NSBRI initiatives had enabled the Agency to make progress toward mitigating human health and performance risks associated with space travel. For example, HRP reported in February 2015 that of the 30 health and human performance risks they study, 27 could be mitigated to an acceptable level for International Space Station (ISS) missions up to a year in duration. However, significant challenges remain for lengthier missions, such as a 3-year trip to Mars, where more than half of the identified health and human performance risks have no mitigation plan.[6]

[5] The Associate Director, Exploration Systems Mission Directorate (ESMD), Health and Performance Directorate and the Deputy, Crew Health and Safety for Space Operations Mission Directorate appointed the 2005 review panel while the Deputy Associate Administrator for ESMD convened the 2010 panel. The reviews' recommendations addressed NSBRI and NASA interactions relating to transforming products from development to spaceflight implementation and ownership of technology. The reviews also included recommendations to track the career paths of students and interns working with NSBRI, host semiannual innovation meetings, and establish a professional development program for NSBRI team members to support succession planning. Because the cooperative agreement was in its final option in 2015, an external review was not conducted.

[6] NASA OIG, "NASA's Efforts to Manage Health and Human Performance Risks for Space Exploration," (IG-16-003, October 29, 2015).

NSBRI annually provides a report to NASA summarizing its accomplishments related to risk mitigation, technology development, and data utilization. For example, several NSBRI-funded science and technology projects in 2016 related to space exploration risks were completed or significantly advanced, including:[7]

- *Sleep Risk*. NSBRI research contributed to HRP's recommendation for the installation of solid-state lights in the ISS crew sleeping quarters in August of 2016.[8] Installation of these lights by the Expedition 49 crew enabled testing to improve sleep patterns and enhance alertness and performance. The lights replaced fluorescent General Lamp Assemblies that contain potentially toxic mercury vapor. This work assisted in addressing the sleep-related risks identified within NASA's overarching Human Research Roadmap.
- *Vision Risk*. NSBRI collected and analyzed astronaut health data regarding spaceflight-induced intracranial pressure (ICP) vision alterations to help HRP mitigate visual impairment experienced by astronauts during space flight. With this data, NSBRI's team made the first direct measurements of ICP in healthy brains to determine the effects that pressure has on vision. NSBRI findings changed how the space biomedical community evaluates the effects of ICP on visual impairment syndrome. NSBRI continues to evaluate devices that can be used for non-invasive monitoring of ICP.
- *CO_2 Cranial Pressure Risk*. NSBRI collaborated with the German Aerospace Center to investigate the effects of simulated space flight conditions on brain physiology. This study examined how human brain physiology adapts to conditions normally found in space flight, specifically increased levels of fluid inside the skull induced by head-down tilt in combination with elevated carbon dioxide levels.

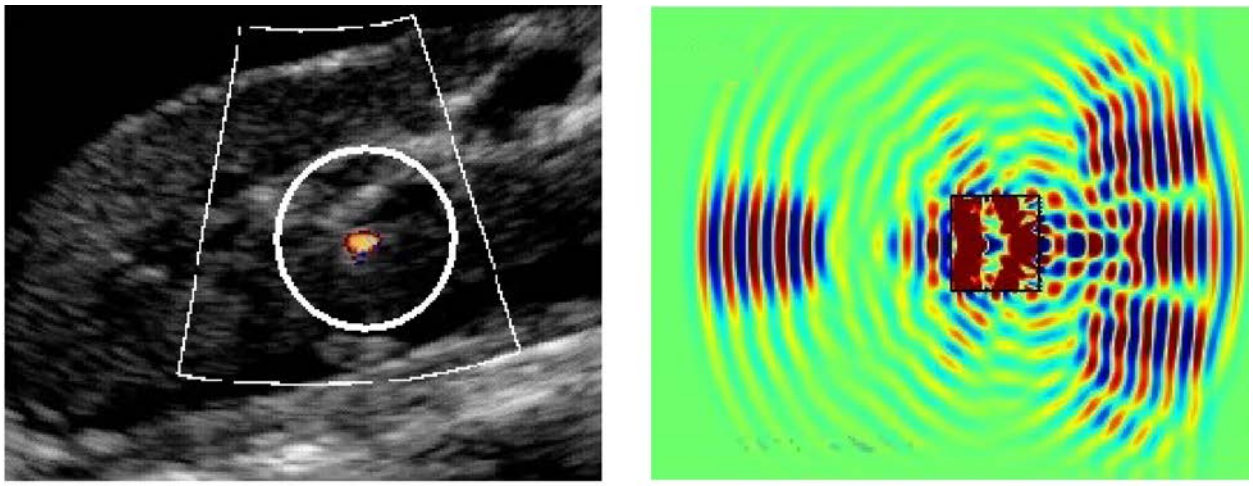
NSBRI research has also been used to improve life on Earth by applying findings from space-based research to detect health risks. NSBRI-funded researchers developed a method to use diagnostic ultrasound for early detection of kidney stones in astronauts as shown in Figure 1.[9] With this technology, NASA physicians are able to detect and diagnose smaller kidney stones during pre-flight screening to reduce the risk of stones forming in flight. With continued development, astronauts on exploration missions may be able to diagnose and track kidney stones as they form, reposition them into the ureter for clearance, and dissolve any stone that becomes lodged or is too large for passage. Having these capabilities on board is expected to significantly reduce the risk of kidney stones impacting the health of the astronauts or the success of the overall mission. In turn, this research has been shared with physicians on Earth to better identify the risk of kidney stone formation.

[7] The risk elements include human factors and behavioral performance, exploration medical capability, human health countermeasures, space radiation, and ISS medical projects.

[8] Solid State Lighting is lighting applications that use light-emitting diodes (LEDs), organic light-emitting diodes (OLEDs), or light-emitting polymers. Unlike incandescent or fluorescent lamps that create light with filaments and gases encased in a glass bulb, solid-state lighting consists of semiconductors that convert electricity into light. LEDs have been around for more than 50 years but until the early 2000s were used only in electronic devices as indicator lamps. Solid state lights will replace fluorescent lights on ISS.

[9] Astronauts are at increased risk of renal stone development due to microgravity, dehydration, and altered bone metabolism associated with space flight.

Figure 1: Example of NSRBI-Funded Technology



"Twinkling" photos of a kidney stone taken using Doppler ultrasound imaging.

Source: NASA.

NSBRI Charged Improper and Unreasonable Expenses to the Cooperative Agreement

While much of the NSBRI spending we reviewed complied with the law and the terms of the cooperative agreement, we question expenses associated with renovation and rental of laboratory and office space at a building occupied by NSBRI. In addition, we question the reasonableness of transportation and meeting expenses of the Institute's board of directors and external advisory council. As a result, we question NASA's investment of $7.8 million for the research facility and NSBRI payments of $41,788 to food and transportation vendors. See Appendix B for a consolidated list of questioned costs.

Consolidated Research Facility

Under the initial cooperative agreement that began in April 1997, NSBRI staff occupied approximately 5,000 square feet of office space in the neurosensory building located in the Texas Medical Center owned by the Baylor College of Medicine and Houston Methodist Hospital. Lease costs for this space from FY 1999 through FY 2010 totaled about $80,255 (less than $7,000 annually). In November 2009, NSBRI asked NASA for permission to use cooperative agreement funds to renovate the ninth floor of a separate building – the BioSciences Research Collaborative facility owned by Rice University – to establish the Consolidated Research Facility that would house NSBRI operations. In June 2010, during NSBRI's final 7 years of performance under the 20-year cooperative agreement, the NASA contracting officer with responsibility for the NSBRI agreement approved the use of $2.9 million for the renovation.

The Consolidated Research Facility consists of laboratories for science and education as well as space for the NSBRI's administrative staff and is designed to demonstrate, test, evaluate, and integrate countermeasures and technologies developed by NSBRI investigators. According to the documents prepared at the time, the facility would provide a venue for collaboration between scientists, NSBRI management, and NASA officials involved in biomedical research to help facilitate a better understanding of NSBRI research and allow more effective assessment of technology for both space-based and Earth-based applications. Moreover, the documentation stated that NSBRI sought to renovate the Facility to help implement a recommendation in the 2005 external review that identified the need for better collaboration among stakeholders.

In our judgment, NASA improperly approved NSBRI's request to use cooperative agreement funds to renovate the NSBRI work space. Federal appropriations may not be used for such capital improvements because the renovation, in a building leased by NSBRI and owned by Rice University, constitutes a permanent improvement to private property. Lacking specific legislative authority, the general rule of appropriations law prohibits the Government from using Federal funds to improve a private facility.[10]

Limited exceptions to this prohibition are possible when such improvements are advantageous to the Government. However, prior to granting such exceptions, the U.S. Government Accountability Office (GAO) has ruled that the following four-part test should be used to determine the propriety of such expenditures:

1. whether improvements were incidental to and essential for the accomplishment of the purpose of the appropriation;

2. whether the cost of the improvement was in reasonable proportion to the overall cost of the lease or contract price;

3. whether improvements were used for the principal benefit of the Government; and

4. whether the interest of the Government in the improvements was fully protected.[11]

In the case of NSBRI, no specific legislation authorizes expenditure of NASA-appropriated funds for capital improvements at the Rice University property. In addition, based on our interviews and review of documentation, the Agency did not thoroughly analyze the expenditure in accordance with GAO's four-part test before authorizing use of research funds for the renovation. Moreover, NASA appears to have disregarded the rationale underlying its 2006 denial of an analogous request by NSBRI to "build out" a privately-owned building leased by NSBRI.[12] In that case, the Contracting Officer denied NSBRI's request after noting that a Federal agency can only expend appropriated funds as authorized by law and deemed the requested use of cooperative agreements funds "unallowable." The Contracting Officer stated in his written decision, "It is determined that 'build out' costs, as a direct charge, are not of a type recognized ordinary and necessary for the performance of the award. These are costs (e.g., capital improvements) that would normally be incurred by the landlord via lease costs (which NSBRI is

[10] 5 Comp. Dec. 478 (1899); 6 id. 295 (1899); 2 Comp. Gen. 606 (1923); 19 id. 528 (1939); 38 Comp. Gen. 143 (1958)

[11] 42 Comp. Gen. 480 (1963); See also 53 Comp. Gen. 351 (1973)

[12] In 2006, NSBRI sought almost $1 million to develop a consolidated facility in a building owned by the Texas Medical Center. In a December 2006 letter to NSBRI about use of cooperative agreement funds to pay for one-time "build-out" costs, the contracting officer concluded that such costs would be an unallowable direct charge to the cooperative agreement and consequently refused to approve the renovation.

incurring)." Less than 4 years later, NSBRI renewed its request to use NASA research funds to renovate its work space, and this time a different Contracting Officer approved the request.

Applying the GAO's 4-part test, we question whether the capital improvements to Rice University property were "essential" to the purpose of the cooperative agreement and its research goals since collaboration efforts could have taken place using existing NASA facilities. Second, although the cost of the capital improvements may be viewed as "reasonable" in proportion to the $484 million in funding associated with the overall agreement, the $2.9 million cost of the renovation represents a large percentage of the agreement's administrative/overhead costs. The significance of this expenditure is heightened given that only 7 years remained in the 20-year agreement. Viewed in this light, the $2.9 million expenditure appears disproportionate to the expected usage of the facilities.[13] Moreover, we note that NSBRI's lease expenses rose from about $7,000 a year prior to the renovation to an average of $800,000 afterwards. Third, we found no evidence NASA officials took steps to determine whether the capital improvements would have any residual value at the end of the agreement or to ensure the interest of the Government in that residual value was fully protected (i.e., negotiation of favorable lease rates to offset the cost of capital improvements).[14]

Neither capital investments nor lease costs were part of the original 1997 NASA-NSBRI cooperative agreement, and up until the renovation was authorized in FY 2010 NSBRI's lease costs had been minimal. Since approval of the Consolidated Research Facility, NSBRI has spent $7.8 million – the initial $2.9 million capital investment to renovate the facility plus $4.9 million in rental fees from FY 2011 through FY 2016 at costs ranging from $367,000 to $1.02 million per year compared to the $7,000 per year for the first 13 years of the agreement. The improvements to the facility primarily benefitted Rice University, the owner of the BioSciences Research Collaborative facility, rather than NASA or the Federal Government. Indeed, at the conclusion of NSBRI's cooperative agreement with NASA in September 2017, possession of the Research Facility renovated at NASA's expense reverted to Rice University.

In early December 2017, Johnson legal counsel produced documentation they believe supports NASA's authority to expend appropriated funds for renovation of the Rice University facility. The documentation included a letter previously provided to our audit team and signed by the Contracting Officer. However, this copy of the letter contains an additional handwritten note referencing OMB Circular A-110 as justification for her approval.[15]

[13] 35 Comp. Gen. 715 (1956)

[14] 42 Comp. Gen. 480 (1963)

[15] The two letters are identical except for the handwritten words referencing OMB Circular A-110 added at the bottom of the document below the CO's signature. Given the fact that the audit team has a copy of the letter without the handwritten message, it is unclear to us when – or why – the explanatory language was added.

OMB Circular A-110 addresses requirements imposed on award recipients concerning the use and disposition of real property acquired under an award. Among its mandatory requirements are that "title" to the real property vest in the award recipient. When the real property is no longer being used for the award purposes, A-110 directs the award recipient to disposition the property in accordance with instructions from the agency. In this case, a private third-party (Rice University) rather than the award recipient (Baylor University) ultimately reacquired possession of the real property renovated at taxpayer's expense using cooperative grant research funds.[16]

In sum, NASA's unreasonable approval of NSBRI's request to use cooperative agreement funds to renovate its facility meant that $7.8 million could have been used to fund additional biomedical research but instead was spent on a building renovation and increased rent costs.

Meeting and Travel Expenses

We reviewed NSBRI expense data to determine if it used cooperative agreement funds appropriately and if its costs were allowable and reasonable. From FY 2012 through FY 2016, NSBRI had 2,153 transactions for travel and local meetings expenses at a cost of about $1.1 million. We evaluated these expenses to identify transactions that indicated patterns of internal control weaknesses or fraud.[17] As a result of our analysis, we identified less than a dozen questionable transactions for travel and local meeting expenses. Of the $69,916 NSBRI charged NASA, we considered about $41,788 to be unreasonable expenses under Federal guidelines and NSBRI policy. In requesting reimbursement for these costs, NSBRI did not follow its own policies that, in keeping with OMB requirements, impose limits on costs incurred for travel and related expenses. Below are the transactions we deemed unreasonable:

- ***Nikkos Worldwide Chauffeured Services*** (Washington, D.C.). NSBRI held events in Washington, D.C., in October 2013 and March 2014.[18] NSBRI contracted with Nikkos to transport passengers to and from Metropolitan Washington, D.C. area airports, railway stations, hotels, and other locations such as the U.S. Capitol Visitor Center and the Rayburn House Office Building. Overall, Nikkos transported 215 passengers and typically charged NSBRI between $96.29 and $100.47 per person, compared to cab fares of about $26 per person.[19] In addition, Nikkos used six cargo van and bus trips to transport demonstration equipment and passengers between the

[16] While not contemporaneously cited by the Contracting Officer, Agency officials now raise OMB Circular A-21 as authority to make "capital expenditures" using cooperative agreement research funds. We acknowledge the Agency's authority to make such expenditures. However, this authority is not without limit. OMB Circular A-21 states in pertinent part, "The arrangements for Federal agency and institutional participation in the financing of a research, training, or other project are properly subject to negotiation between the agency and the institution concerned, in accordance with such government-wide criteria or legal requirements as may be applicable." The four-part test regarding use of appropriated funds to finance capital improvement to private property is an example of such government-wide criteria.

[17] We used the ACL data analytic tool to evaluate NSBRI's cost elements related to travel and local meeting expenses. ACL is a data extraction and analysis software used for fraud detection, prevention, and risk management. By sampling large data sets, the software can help identify irregularities or patterns in transactions that could indicate control weaknesses or fraud.

[18] The event was the NSBRI Board of Directors meeting, "Bringing Space Biomedical Advances Down to Earth" at the U.S. Capitol Visitor Center on March 5, 2014. The vendor used either a sedan, a sport utility vehicle, or cargo van to transport passengers and demonstration equipment to and from Washington Reagan, Washington Dulles, and Baltimore Washington International Airports to a Marriott hotel in Washington, D.C. The vendor also transported passengers between other locations, such as Philadelphia International Airport to 30th Street Station in, Philadelphia, PA, Union Station in Washington, DC and the Marriott Hotel, which is approximately 6 miles from Reagan National Airport.

[19] We used a public taxi fare finder website to estimate the cost of transportation to the venues listed in the invoices.

Marriott Georgetown hotel and the Capitol Visitor Center. Nikkos billed NSBRI $23,664, of which we estimated $16,484 was unreasonable.

- ***City Kitchen*** (Houston, Texas). During three NSBRI External Advisory Council and Board of Directors' meetings in FY 2014 attended by 21 to 28 individuals, City Kitchen billed $51 to $55 per person for food and beverages. We compared these rates to the General Services Administration (GSA) per diem lunch rate of $15 per person and concluded that $3,665 of the $11,695 billed by City Kitchens for these meals was unreasonable.[20]
- ***Hotel Zaza*** (Houston, Texas). During seven days of External Advisory Council and Board of Directors' meetings in October 2015, March 2016, and April 2016, Hotel Zaza billed NSBRI for nine meals consisting of breakfast, lunch and dinners for 26 to 38 attendees at each event. However, the invoices provided no price per person for food and beverages. We compared the GSA's per diem rates of $15 per person for lunch and $26 per person for dinner to the number of attendees shown on meeting documentation. In total, Hotel Zaza billed NSBRI $26,501 for food and beverages, of which we estimated $21,639 was unreasonable.

[20] GSA per diem rates are reimbursement amounts that vary by city used for lodging and meals when travelling on official business. The rates are used by all Federal Government employees as well as many private-sector companies.

NASA'S FUTURE PLANS FOR BIOMEDICAL RESEARCH

As currently structured, NASA will pay $245.7 million through September 30, 2028, under the new cooperative agreement for biomedical research with TRI run by Baylor College of Medicine. As noted earlier, TRI's focus is on moving fundamental research into practical applications whereas NSBRI primarily focused on the research to understand and mitigate biomedical risks associated with human space travel. Like NSBRI, members of the TRI consortium are expected to conduct biomedical research as well as identify other experts in the field and assign them specific research goals.

According to a NASA official, the decision to use TRI to facilitate this type of biomedical research was made because such an external institute was better positioned than NASA to identify and attract cutting edge research and technology given the consortium members' extensive expertise and professional networks in these areas.

However, we question this rationale given NASA's increased capabilities in this area since the advent of HRP, especially with regard to many of the administrative activities related to awarding research grants. Specifically, it is unclear to us which entity – NSBRI or HRP – was completing the various management and research tasks associated with conducting biomedical research. In fact, HRP has evolved since its establishment in 2005 and taken on the primary responsibility for the Agency's space biomedical research, including many of the activities previously performed by NSBRI related to soliciting external experts and research partners. Based on the initial cooperative agreement, NSBRI was responsible for defining, development, and implementation of a Space Biomedical Research program. Since 2005, HRP has defined and managed a set of five primary "research elements" – (1) human factors and behavioral performance, (2) exploration medical capability, (3) human health countermeasures, (4) space radiation, and (5) International Space Station medical projects – that correspond to research areas related to human activities in space. In the later years of the NSBRI cooperative agreement, each research element was jointly managed by an HRP manager and scientist that worked directly with NSBRI to monitor the progress of NSBRI-managed biomedical research.

In addition, since its establishment 12 years ago HRP has taken on many of the functions formerly performed by NSBRI such as identifying researchers for grant funding. For example, HRP has a performance management structure in place to identify both internal and external researchers to conduct biomedical research.[21] This includes a technical and management hierarchy for planning biomedical research expectations, a Path to Risk Reduction that tracks the status of identified risks, quarterly technical and budgetary reviews that monitor performance and routine requests for research,

[21] According to the Office of Personnel Management (OPM), performance management in the Federal Government is the systematic process by which an Agency involves its employees, as individuals and members of a group, in improving organizational effectiveness to accomplish agency goals. Employee performance management includes: planning work and setting expectations, continually monitoring performance, developing the capacity to perform, periodically rating performance, and rewarding good performance.

and peer reviews that assess funding decisions and HRP's ability to accomplish its long term goals.[22] Moreover, HRP has processes in place to manage the process for attracting external researchers including issuing solicitations, evaluating proposals, and monitoring sub-recipients. In our judgment, NASA should consider leveraging more of HRP's capabilities rather than relying on outside institutes like NSBRI and TRI to identify and manage external researchers for future biomedical research.

During the audit, we discussed with Agency officials concerns about potential duplication of effort and redundant administrative costs given the similarity of HRP's and NSBRI's research efforts. Agency officials reiterated the value of the expertise provided by NSBRI and TRI. Nonetheless, while it was issued more than a year after establishment of the cooperative agreement with TRI, we are encouraged that the Cooperative Agreement Management Plan (CAMP), finalized in September 2017, directs TRI to leverage existing NASA/HRP capabilities where appropriate.[23] For example, the CAMP directs TRI to use an existing NASA contract for solicitation and peer review services for many of its research solicitations with the cost of these services deducted from the disbursement provided to TRI. The plan also directs TRI to pursue research not currently being performed or funded by HRP, which should help reduce potentially costly duplication of efforts. In addition, NASA and TRI will share their respective plans for education outreach and modify any conflicts. Finally, the CAMP directs TRI to minimize its brick and mortar infrastructure and travel requirements in favor of virtual communication, and when not available to use existing NASA conference, meeting, and laboratory facilities at NASA.[24] These measures should help ensure that TRI does not incur unreasonable facility costs as was the case with NSBRI.

It is too early to determine whether TRI will utilize existing NASA capabilities or to what extent leveraging those capabilities will reduce the costs of the Agency's biomedical research efforts. We were concerned with the year-long delay in finalizing the CAMP, leaving TRI without clear guidance for pursuing NASA's biomedical research mission.[25] That said, the guidelines detailed in the CAMP represent a positive step towards achieving the Agency's goals.

[22] A Path to Risk Reduction is a detailed schedule setting forth the rate by which HRP expects to complete development of countermeasures for the identified risks.

[23] A CAMP describes the agreement's terms and conditions and details how NASA and TRI will conduct joint research activities.

[24] At the time of our review, TRI was not occupying the renovated space that formerly housed NSBRI.

[25] The cooperative agreement with the institute was awarded in September 2016, but the CAMP was not in place until September 2017. Agency officials admitted that the CAMP should have been in place at approximately the same time as the award of the cooperative agreement but did not offer an explanation for the delay.

CONCLUSION

NSBRI played an important role in improving NASA's knowledge of human physiological responses to space travel and in developing research to help the Agency mitigate the most serious human health and performance risks during its 20-year, $484 million cooperative agreement with NASA. We remain concerned, though, that NASA improperly permitted NSBRI to use $7.8 million of research funds to renovate and pay rent for laboratory space in a private building during the final 7 years of its agreement. In its new 12-year agreement with TRI, NASA needs to exercise strong oversight to ensure efficient operations and prevent unnecessary duplication of research and administrative costs.

RECOMMENDATIONS, MANAGEMENT'S RESPONSE, AND OUR EVALUATION

To ensure the proper closeout of the agreement with NSBRI and ensure that NASA is receiving all promised services, we recommended that the Johnson Center Director:

1. Remedy $2.9 million in cooperative agreement funds improperly authorized to renovate the Consolidated Research Facility.

2. Remedy $4.9 million in cooperative agreement funds spent on unreasonable rental costs for the Consolidated Research Facility post-renovation.

3. Remedy the $41,788 in cooperative agreement funds spent on unreasonable meeting and travel costs.

To ensure efficient operations and prevent unnecessary duplication of research and administrative costs, we recommended that the Johnson Center Director:

4. Monitor the cooperative agreement closely to ensure TRI leverages existing NASA capabilities and functions in order to efficiently and effectively achieve the biomedical research goals.

We provided a draft of this report to the Associate Administrator for Human Exploration and the Director of the Johnson Space Center for their review and comment. Responding to the OIG's four recommendations, management partially concurred with recommendation 3 and concurred with recommendation 4. For these two recommendations, we consider management's comments responsive; therefore, the recommendations are resolved and will be closed upon completion and verification of the proposed corrective actions.

While NASA responded that it "partially concurred" with recommendations 1 and 2, it is difficult to determine which part of the recommendations they agreed with. What is clear is that Agency managers do not agree with our conclusion that NASA should remedy the $7.8 million in cooperative agreement research funds spent on what we determined were unreasonable renovation and rental costs for NSBRI's Consolidated Research Facility. Instead, the Agency said it believes use of $2.9 million in agreement funds to renovate private office space for the NSBRI and the group's subsequent lease expenses of $4.8 million over the remaining 7 years of the 20-year agreement were proper. We disagree for the reasons articulated below.

NASA management acknowledges the authority of GAO's four-part test to identify exceptions to the general prohibition against using Federal research funds for capital expenditures to private property. In this case, the facility in question was not owned by Baylor but rather by Rice University – a non-party to the cooperative agreement.

NASA contends that its Contracting Officer thoroughly evaluated Baylor's renovation proposal and exercised appropriate discretion in authorizing an exception to use of agreement funds for the renovation, but merely failed to adequately document consideration of the four GAO factors.

However, management's response is an after-the-fact rationalization for an improper decision that, among its many shortcomings, fails to address whether the Contracting Officer considered the finding of another NASA Contracting Officer who reviewed a similar NSBRI renovation proposal 3 years earlier and concluded the request was "unallowable."

In sum, we find NASA's response unpersuasive for the following reasons:

- Management acknowledges "minimal" documentation demonstrating that the capital expenditure was "incidental to and essential" to accomplishing the goals of the cooperative agreement. We agree that documentation of the Contracting Officer's analysis was minimal at best. Moreover, our audit determined NSBRI management and the Contracting Officer failed to demonstrate that they considered, among other options, existing JSC facilities, an omission that further undercuts any claim of due diligence.

- When analyzing whether the cost of a capital improvement was "reasonable" compared to the overall cost of the cooperative agreement, the review must also assess whether the cost of the improvement is "disproportionate to the government's needs" 35 Comp. Gen. 715 (1956). In NSBRI's case, a $2.9-million-dollar renovation represented a significant and disproportionate share of the administrative/overhead costs associated with the 7 remaining years of the cooperative agreement. We question whether this additional overhead cost represented an essential government "need." Moreover, the money used to fund the renovation and resulting lease costs could have been used for additional biomedical research rather than overhead costs.

- With respect to the high lease costs for the NSBRI facility post-renovation, we appreciate management's discussion concerning "square footage," "building value," and percentage increase in "collaborative activities." However, at best these arguments represent an *ex post facto* rationale for actions previously taken rather than evidence of a thorough analysis conducted prior to expenditure of appropriated funds. Further, management cites OMB Circular A-21 to argue the capital expenditure for the renovations did not "materially increase" the value of Rice University property while ignoring the fact that Rice University was not a party to the cooperative agreement. Moreover, we disagree with NASA's interpretation that OMB Circular A-21 confers broad discretion on Federal agencies to use appropriated funds to make capital improvements to private property of third-parties as long as the improvement does not "materially increase" the value of the property.

- Management fails to provide evidence it took proactive steps prior to approving the capital improvements to determine (1) whether the Rice University property would have any residual value at the end of the cooperative agreement, and (2) whether that residual value was considered and used during the lease negotiations with NSBRI to adequately compensate the Government for its initial investment. While management contends that low lease costs in the first decade of the agreement resulted from a special arrangement, we saw no evidence to suggest the Contracting Officer considered the reasonableness of lease costs post-renovation – an increase from $7,000 per year to $800,000 per year. Therefore, we are not satisfied management took adequate steps to protect the Government's interests in the capital improvements made to Rice University property.

We believe NASA should take action to remedy the $7.8 million in cooperative agreement funds spent on renovation and lease costs for the Consolidated Research Facility. To be clear, when using the term "remedy" we recommend that, to the extent practicable, the Agency seek reimbursement for the unreasonable costs incurred. This effort should not be limited to simply seeking payment from NSBRI – which may be impractical at this juncture given the fact the cooperative agreement has ended – but should involve a broader consideration of other reimbursement opportunities. For example, NASA could seek in-kind compensation or negotiate more favorable terms to current and future agreements with Baylor University.

Consequently, recommendations 1 and 2 are unresolved pending further discussion with the Agency. Management's comments are reproduced in Appendix C while technical comments provided by management have been incorporated, as appropriate.

If you have questions about this report or wish to comment on the quality or usefulness of this report, contact Laurence Hawkins, Audit Operations and Quality Assurance Director, at 202-358-1543 or laurence.b.hawkins@nasa.gov.

Paul K. Martin
Inspector General

Major contributors to this report include, Ridge Bowman, Space Operations Director; Vincent Small, Project Manager; Eugene Bauer; Jaye Beggs; Cedric Campbell; Dr. Noreen Khan-Mayberry; Ellis Lee; and Matt Ward.

APPENDIX A: SCOPE AND METHODOLOGY

We performed this audit from November 2016 through December 2017 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

The audit objective was to assess NASA's cooperative agreement with NSBRI to improve understanding of the effects of the space environment on human performance. As part of our review, we examined whether NSBRI used cooperative agreement funds for their intended purpose; costs associated with the agreement were allowable, reasonable, and in accordance with applicable laws, regulations, and guidelines; whether NASA and NSBRI performed adequate management oversight; and whether internal controls were adequate.

We reviewed the following criteria:

- Title 2 Code of Federal Regulations (2 CFR) Grants and Agreements, Chapter II, Part 200 Office of Management and Budget Guidance
    - Subtitle A, Office of Management and Budget Guidance for Grants and Agreements, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, November 2016
    - Subtitle B, Federal Agency Regulations for Grants and Agreements, Part 1800, National Aeronautics and Space Administration, November 2016
- Title 14: Aeronautics and Space, Chapter V, National Aeronautics and Space Administration 14 CFR 1275 Research Misconduct November 2016
- NASA Grant and Cooperative Agreement Manual, December 26, 2014
- Cooperative Agreement NCC-98's terms, conditions, and requirements with NSBRI
- Cooperative Agreement NNX16AO69A's terms, conditions, and requirements with the Baylor College of Medicine Translational Research Institute
- Baylor College of Medicine Policies and Procedures, 13.1.0, College Business Operations: Employee Business Expense, July 1, 2010

We interviewed: Human Exploration and Operations Mission Directorate Representatives; the Human Research Program (HRP) Director and Deputy Director; JSC Procurement representatives; JSC Contracting Officer's Representative; the National Space Biomedical Research Institute (NSBRI) Director and Chief Financial Officer; and the Baylor College of Medicine Contracts Director.

We reviewed: NASA Cooperative Agreement NCC 9-58 and Supplements with NSBRI; NASA Cooperative Agreement NCC 9-58 Cooperative Agreement Management Plans; NSBRI Strategic Plan 2010; FY 2012, 2016 NSBRI Annual Technical and Scientific Reports; FY 2012, 2015 NSBRI Science and Technology Program Project Executive Summaries; FY 2012, 2016 NSBRI Science, Technology and Career Development Programs Publications, Reports and Intellectual Property; FY 2016 NSBRI List of Deliverables; NSBRI General Ledger of Accounts; NSBRI Subsidiary Ledger of Accounts; Payments and

Drawdowns by NSBRI; Quarterly Recipient's Cost Reports; FY 2016 Monthly Activity Reports; Annual Progress Reports; Annual Continuing Progress Letters; Financial transactions among NSBRI and corresponding support for transactions; Comprehensive Review Reports; and NASA Cooperative Agreement NNX16AO69A and Supplement with Baylor College of Medicine's Translational Research Institute (TRI).

From July 1999 through September 30, 2016, NSBRI spent about $398.5 million. Based upon this data and information, we separated the expenses into 31 major cost categories, and 124 cost "sub-categories." Based upon this analysis, we focused our review on 7 major and 8 minor-categories.

We used the ACL data analytic tool to evaluate NSBRI's cost elements. The ACL tool highlights unusual transactions that require additional scrutiny because the transaction costs deviate from the amounts posted in the general ledger and therefore indicated patterns of internal control weaknesses or fraud. We judgmentally selectively 30 transactions, valued at $3.35 million. From FY 2012 through FY 2016, NSBRI had 2,153 transactions costing about $1.1 million on travel and local meeting expenses. Based on the analysis we identified 8 specific transactions for detailed review under travel and local meeting expenses cost elements. Our results are discussed in the body of this report.

Use of Computer-Processed Data

We used computer-processed data to perform this audit. We compared computer-processed data to invoices and other appropriate supporting documents to determine adequacy. Specifically, we obtained NSBRI's electronic records and obtained supporting documentations to validate transactions reviewed. Based upon our review, we concluded that the computer-processed data was adequate and we believe the information we obtained is sufficiently reliable for this report.

Review of Internal Controls

We evaluated the internal controls included in 2 CFR 200, 2 CFR 1800, 14 CFR 1275, the NASA Grant and Cooperative Agreement Handbook, and Baylor College of Medicine's policies and procedures for College Business Operations, and employee business expenses. We concluded that the controls were adequate, except for those discussed in the body of this report.

Prior Coverage

During the last 5 years, the NASA Office of Inspector General (OIG) and the Government Accountability Office (GAO) have issued 17 reports of particular relevance to the subject of this report. Unrestricted reports can be accessed at https://oig.nasa.gov/audits/reports/FY18/index.html (NASA OIG) and http://www.gao.gov (GAO).

NASA Office of Inspector General

*Review of NASA-Funded Institute*s (IG-16-023, June 9, 2016)

Audit of NASA Space Grant Awarded to the University of Texas at Austin (IG-16-013, February 18, 2016)

Audit of a NASA Research Grant Awarded to the University of Miami (IG-16-011, January 21, 2016)

NASA's Efforts to Manage Health and Human Performance Risks for Space Exploration (IG-16-003, October 29, 2015)

Audit of NASA's Cooperative Agreements Awarded to Wise County Circuit Court (IG-15-022, July 16, 2015)

Audit of NASA's Cooperative Agreement Awarded to the City of New Orleans (IG-15-018, June 29, 2015)

Audit of NASA's Cooperative Agreement with Bio Serve Space Technologies - University of Colorado at Boulder (IG-14-028, August 4, 2014)

Audit of Grant Awarded to North Carolina State University (IG-14-027, July 23, 2014)

Audit of NASA Grants Awarded to the Alabama Space Science Exhibit Commission's U.S. Space and Rocket Center (IG-12-016, June 22, 2012)

Audit of NASA's Cooperative Agreement Awarded to Rockwell Collins (IG-14-025, July 14, 2014)

Audit of NASA Grant Awarded to HudsonAlpha Institute for Biotechnology (IG-12-019, August 3, 2012)

Audit of NASA Grants Awarded to the Philadelphia College Opportunity for Resources for Education (IG-12-018, July 26, 2012)

Government Accountability Office

Grants Management: Actions Needed to Address Persistent Grant Closeout Timeliness and Undisbursed Balance Issues (GAO-16-352, April 14, 2016)

Grants Management: Programs at HHS and HUD Collect Administrative Cost Information but Differences in Cost Caps and Definitions Create Challenges (GAO-15-118, December 12, 2014)

Grants Performance: Justice and FEMA Collect Performance Data for Selected Grants, but Action Needed to Validate FEMA Performance Data (GAO-13-552, June 24, 2013)

Grants Management: Improved Planning, Coordination and Communication Needed to Strengthen Reform Efforts (GAO-13-383, May 23, 2013)

Grants Management: Action Needed to Improve the Timeliness of Grant Closeout by Federal Agencies (GAO-12-360, April 16, 2012)

APPENDIX B: SCHEDULE OF QUESTIONED COSTS/DOLLAR-RELATED FINDINGS

Table 1 below summarizes the questioned costs identified during our audit and discussed in this report. These costs are the result of improper use of cooperative agreement funds to pay for renovations of work space resulting in $7.8 million in excessive facility costs and unreasonable transportation and meal expenses.

Table 1: Questioned Costs and Associated Recommendations

Issue	Recommendation #	Questioned Costs
Improper approval of NSBRI's request to use cooperative agreement funds to renovate NSBRI work space.	1	$2,869,311
Unreasonable lease expenses associated with the renovation of NSBRI work space.	2	$4,880,668
Unreasonable Transportation expenses compared to similar services from alternative sources.	3	$16,484
Unreasonable Meal Expenses compared to GSA's per diem rates.	3	$25,304
	Total	**$7,791,767**

Source: OIG Analysis.

Note: Questioned Costs are expenditures that are questioned by the OIG because of alleged violation of law, regulation, or contractual requirement governing the expenditure of funds; costs that are not supported by adequate documentation at the time of our audit; or are unallowable, unnecessary, or unreasonable.

APPENDIX C: MANAGEMENT'S COMMENTS

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
2101 NASA Parkway
Houston, Texas 77058-3696

January 25, 2018

Reply to Attn of: SA-18-007

TO: NASA Headquarters
Attn: Assistant Inspector General for Audits

FROM: AA/Director

SUBJECT: Agency Response to Office of Inspector General (OIG) Draft Report, "Audit of the National Space Biomedical Research Institute's Cooperative Agreement" (A-17-001-00)

NASA appreciates the opportunity to review and comment on the OIG draft report entitled, "Audit of the National Space Biomedical Research Institute's Cooperative Agreement" (A-17-001-00), dated December 14, 2017.

We also appreciate that the OIG recognized the technical performance of the National Space Biomedical Research Institute (NSBRI), under the auspices of NASA's Human Research Program (HRP) based at the Johnson Space Center (JSC). The HRP manages NASA's space flight biomedical research. Though the Cooperative Agreement has concluded as of September 30, 2017, the OIG found research products delivered by NSBRI have helped NASA make progress toward mitigating human health and performance risks to humans in space. The OIG positively notes that from inception, the NSBRI has brought together biomedical, science, and engineering experts to investigate and help find solutions for physiological and performance risks faced during long-duration periods in space, such as extended exposure to radiation and the effects of living in altered gravity. Over the course of the agreement, the NSBRI conducted research as well as awarded research funds on a competitive basis to about 60 institutions in 25 states – creating mutually beneficial technical collaboration among academia, industry, and state governments; and ultimately with NASA.

However, the report questions decisions made in 2009-2010 regarding capital expenditures for leased space occupied by the NSBRI and rental costs. The audit also questioned whether the Agency had the authority to approve renovations of the Consolidated Research Facility (CRF). NASA asserts the Contracting Officer's (CO) decision to approve the renovations and lease costs when viewed within the context of applicable regulations, guidance, industry advancements, and technical requirements at that time demonstrate that a reasonable approach was taken by NASA. This is further supported by Memorandum SA-17-113, documenting that from 1997-2011, the NSBRI had access to lease space at Methodist

Hospital at a rental cost well below fair market value due to relationships that existed between the NSBRI Chair and the Baylor College of Medicine. However, by 2009, the NSBRI lost access to the low-cost lease space and was required to seek alternative lease space. During that time, NASA's focus was to foster and achieve maximum benefit from the technical exchanges and collaboration among NSBRI, academia, industry, and government. This NASA objective led the team to find the BioScience Research Collaborative (BRC) located in the Houston, Texas Medical Center (TMC), which at the time and currently, is an innovative space where scientists and educators work together to perform leading research that benefits human medicine and health. The research being performed at the BRC is an interdisciplinary, inter-institutional catalyst for new and better ways to collaborate, explore, learn, and lead. This was of significant interest to NASA because the BRC was leading the industry in biomedical research and received significant funding for terrestrial biomedical research, which provided tremendous potential to move NASA forward in addressing human space flight risks. Further, the lease costs were in line with comparable spaces in that area at the time. It is our position that when viewed in context with the technical performance objectives and options available at that time, NASA used appropriate discretion in authorizing the expenditure of funds for the alternate location renovation and associated lease costs.

In the draft report, the OIG makes four recommendations to the JSC Center Director, intended to ensure the proper close out of the Cooperative Agreement with the NSBRI and to ensure efficient operations and prevent unnecessary duplication of research and administrative costs. Specifically, the OIG recommends the following:

To ensure the proper close out of the agreement with NSBRI and ensure that NASA is receiving all promised services, the OIG recommends that the JSC Center Director:

Recommendation 1: Remedy $2.9 million in cooperative agreement funds improperly authorized to renovate the CRF.

Management's Response: Partially Concur. First, NASA disagrees with the use of the word "remedy" due to an indefinite meaning. The use of the word "remedy" may be interpreted to mean "seek monetary reimbursement from NSBRI (in the amount of $2.9 million)." Subsequently, the OIG has conveyed to NASA that "remedy" does not necessarily imply monetary reimbursement. However, the report does not explicitly eliminate this interpretation. Therefore, NASA does not fully concur with the recommendation.

Second, NASA disagrees with use of the term "improperly approved." For the reasons stated below, we believe that NASA did have reason to approve the Baylor proposal; however, we acknowledge that this approval required the Agency to invoke an exception to the general rule that capital expenditures for improvements to private property require specific statutory authority. The Contracting Officer did thoroughly evaluate the proposal submitted by Baylor and did collect documentation relevant to the application of the exception to the general rule. However, the Contracting Officer's record of approval did not address each of the four factors relevant to the exception to an appropriate degree of detail. The Contracting Officer

was also aware that CFR §1260.127 Allowable Costs, and Office of Management Budget (OMB) identified the relevant provision of OMB Circular A-21, "Cost Principles for Educational Institutions" – Section J.18.2(1), Equipment and Other Capital Expenditures, which is discussed below. The Contracting Officer did not, however, thoroughly consider and document the factors that are relevant to the decision to approve the capital expenditures proposed by Baylor.

In June 2010, the Recipient submitted a proposal for the studies, build-out estimates, lease terms, and cost savings of the improvements to the BRC facility. The Recipient requested formal approval from NASA to proceed with the design, development, and construction of the Consolidated Research Facility. In letter BH4-10-220 dated June 15, 2010, the Contracting Officer acknowledged NASA's review of the proposal and stated NASA would benefit greatly from capabilities developed for human space exploration at the BRC facility collocated with the Center for Space Medicine. The $2.9 million cost to outfit the space with laboratory and office accommodations was deemed appropriate by the Contracting Officer, citing authority in accordance with CFR §1260.125 Revision of Budget and Program Plan; and further authority as contained in the OMB Circular A-21 Section J.18.2(1), Equipment and Other Capital Expenditures, which states: "The following rules of allowability [sic] shall apply to equipment and other capital expenditures: (3) Capital expenditures for improvements to land, buildings, or equipment which materially increase their value or useful life are unallowable as a direct cost except with the prior approval of the awarding agency."

The OIG references the GAO four-part test that has been applied to instances where there is no specific congressional authority to expend appropriated funds to make permanent improvements to private property. NASA acknowledges that a thorough administrative record in support of the approval of the Baylor proposal would have considered the factors identified by GAO in this line of decisions, in order to demonstrate that the circumstances warranted applying the exception to the general rule that capital expenditures for improvements to buildings are unallowable.

NASA believes the criteria in the four-part test were met. The first factor is met because improvements were required to accomplish the cooperative agreement since no comparable NASA facilities were available. The Contracting Officer in letter BH4-09-412 states NASA has reviewed the NSBRI business plan to establish a CRF at the Bioscience Research Collaborative, which also co-located the NSBRI with Baylor's new academic unit, the Center for Space Medicine (CSM). NASA determined this plan was in-line with its own goals and expectations for interdisciplinary collaboration bridging science, medicine, and engineering. While the Contracting Officer's record of consideration of this factor at the time of the approval was minimal, we believe that letter BH4-09-412 supported the conclusion that the renovations to the Rice facility were essential and incidental to the program requirements and objectives. Consideration of this first factor may have been more thorough, but NASA believes the conclusion of the Contracting Officer was reasonable.

Regarding the second factor, NASA concludes that the cost of improvement was reasonable in proportion to the overall funding for the Agreement. While the Contracting Officer's

consideration of this factor at the time of the approval was not thorough, we believe the documentation obtained by NASA at the time supports this conclusion. The 20-year Agreement term had a total value of approximately $484 million. At the time the improvements were approved, $284,548,665 had been obligated on the Agreement. During fiscal years 2010-2017, after the improvements were approved, an additional $148,263,422 was obligated on the cooperative agreement. Taking the cost of the improvements made, $2.9 million, the funding obligated before and after the improvements equates to 1 percent and 1.96 percent, respectively. Accordingly, the cost of the improvement was minimal and therefore reasonable in proportion to the overall funding for the Agreement.

Regarding the third factor, improvements made were for the principal benefit of the Government given the technical performance objectives achieved. Per emporis.com, a leading database for building information worldwide, the BioScience Research Collaborative Institute at Rice today has a building value of $300 million. The $2.9 million remodel was about 0.97 percent of the building value and square footage was about 3.4 percent of the building's space. Therefore, the remodel did not materially increase the value or useful life of the Rice University property in accordance with OMB Circular A-21 Section J.18.2(1), Equipment and Other Capital Expenditures. With no material increase in the value or useful life of the property, the principal benefit from the improvements was to the Government. Further, according to the NSBRI, there was a 25 percent increase in collaborative activities after the CRF was completed, which supported an improvement in the technical performance objectives that were actually achieved.

Finally, regarding the fourth factor, approval was based on the Recipient having negotiated favorable build-out costs and leasing rates within an acceptable range for comparable space. To meet this requirement, the Contracting Officer, in her memorandum letter BH4-09-412 dated December 18, 2009, agreed that the collocation with the Center for Space Medicine would be beneficial to NASA and required "(f)inal approval is contingent on negotiating favorable build-out costs and leasing rates within an acceptable range for comparable space within the Texas Medical Center." Afterward, the NSBRI CRF negotiated cost sharing with the Center for Space Medicine and proposed a base rental lease rate of $23.63-$32.74, which is significantly lower than the average lease rate at this time. According to the Colliers International, a leader in providing global real estate research and statistics for the Houston Office Market, commercial real estate market trends indicate that for Class A rental space between the years 2010 and 2017 the prices per square foot for commercial lease space in the TMC ranged between $35.07 and $43.41. Class A property is defined as buildings in desirable locations that require little to no maintenance and attract the highest quality tenants and the TMC qualifies as a Class A location. The Contracting Officer's requirements for final approval and the NSBRI's negotiations culminated in lower build-out costs and lease rates, thereby protecting the government's interest and meeting the fourth factor requirement.

For the reasons stated above, NASA does not fully concur with Recommendation 1 as written. However, NASA does recognize the need to document the lessons learned as well as the opportunity for process improvement in the form of the following corrective action plan:

Corrective Action Plan: JSC Procurement will remind Contracting Officers of the requirement to analyze, review, and approve allowable capital expenditures under a grant or cooperative agreement and to ensure the requisite level of documentation is included in the file.

Estimated Completion Date: April 30, 2018.

Recommendation 2: Remedy $4.9 million in cooperative agreement funds spent on unreasonable rental costs for the CRF facility post-renovation.

Management's Response: Partially Concur. For the reasons stated in the Management's Response to Recommendation 1, NASA disagrees with the use of the word "remedy" due to an indefinite meaning.

NASA also disagrees with the OIG's conclusion that the rental costs were unreasonable. The original NSBRI space was provided at a favorable rate well below fair market value through the Chairman of the Board at Baylor University. The incoming Department Chair reassigned the space and the NSBRI was required to seek new accommodations. Any selected location would have to been adapted to the specific needs of NSBRI to meet performance objectives. The most suitable space was proposed and approved by NASA to be the Bioscience Research Collaborative Institute, on the Rice University Campus, part of the Texas Medical Center. The decision was based on size, laboratory and other accommodations, and proximity to the advanced technologies available at Baylor to facilitate the real-time technical collaboration that resulted in successful achievement of objectives.

The cooperative agreement does not prohibit the Recipient from finding alternative lease locations or proposing requests to increase lease cost. On this basis, the Contracting Officer reviewed the proposal and approved the lease agreement in a formal response (letter BH4-10-220, dated June 15, 2010).

Therefore, a fair comparison would be of the lease on the renovated Consolidated Research Facility to lease costs of similar square footage at that time, which indicate those Facility rates were actually lower than average lease costs for the area. Refer to OMB Circular A-21 section 43, Rental Cost of Building and Equipment: *"rental costs are allowable to the extent that the rates are reasonable in light of such factors as: rental costs of comparable property, if any; market conditions in the area; alternatives available; and, the type, life expectancy, condition, and value of the property leased. Rental arrangements should be reviewed periodically to determine if circumstances have changed and other options are available."*

According to Colliers International, a leader in providing global real estate research and statistics for the Houston Office Market, the price per square foot of Class A rental space in the TMC between 2010 and 2017 ranged from $35.07 to $43.41. Class A property is defined as buildings in desirable locations that require little-to-no maintenance and attract the highest quality tenants and the TMC qualifies as a Class A location. The NSBRI CRF negotiated with Rice University a base rental lease rate of $23.63-to-$32.74, which is significantly lower than the average lease rate for that time and comprised favorable lease rates.

For the reasons stated above, NASA does not fully concur with Recommendation 2 as written. However, NASA does recognize the need to document the lessons learned as well as the opportunity for process improvement in the form of the following corrective action plan.

Corrective Action Plan: JSC Procurement will remind Contracting Officers of the requirement to analyze, review, and approve lease and rental costs under a grant or cooperative agreement and to ensure the requisite level of documentation is included in the file.

Estimated Completion Date: April 30, 2018.

Recommendation 3: Remedy the $41,000 in cooperative agreement funds spent on unreasonable meeting and travel costs.

Management's Response: Partially Concur. NSBRI provided supporting documentation for the two transportation costs in question that total $16,484 in alleged unreasonable meeting and travel costs. These transportation costs are related to two NSBRI conferences and were planned in accordance with 2 CFR 220.432, which states a non-Federal entity must exercise discretion and judgment in ensuring that conference costs are appropriate, necessary, and managed in a manner that minimizes costs to the Federal Government. The Recipient subcontracted the transportation for the conferences held at the U.S. Capitol Visitor Center to transport specialized research equipment and 100+ attendees on a quick-response basis, while addressing the complexities and security issues related to the location. These costs were deemed reasonable given the circumstances, risk of damage to specialized research equipment, and the logistics of transporting large numbers of people. Alternative transport options did not possess the ability to transport specialized research equipment and would have significantly increased the risk of damage to specialized research equipment.

Therefore, $16,484 or 39.4 percent of the meeting and travel costs were determined by NASA to be reasonable. Of the remaining $25,305 of meeting and travel costs in question, note that Baylor has an institutional travel policy; therefore, General Services Administration per diem rates used to determine reasonableness are not applicable to the cooperative agreement per OMB Circular A-21 for allowable travel costs, such that the NSBRI had discretion regarding the remaining $25,305 of hotel and food costs.

Corrective Action Plan: JSC Procurement will remind Contracting Officers of the existing Agency guidance to evaluate and subsequently negotiate with grant/cooperative agreement proposers regarding reasonableness for proposed meeting, conferences, and travel costs.

Estimated Completion Date: April 30, 2018.

To ensure efficient operations and prevent unnecessary duplication of research and administrative costs, the OIG recommends the JSC Center Director:

Recommendation 4: Monitor the cooperative agreement closely to ensure the Translational Research Institute (TRI) leverages existing NASA capabilities and functions in order to efficiently and effectively achieve the biomedical research goals.

Management's Response: Concur.

NASA already has in-place new controls. The solicitation for TRI returned to the "virtual institute" concept, and increased details required of the Institute's financial reporting (within limits of what can be required of a cooperative agreement). Further, the Cooperative Agreement Management Plan (CAMP) clarifies and specifies a more rigorous approach to tracking costs and expenditures. This Agreement is being administered by the NSSC. In the last week of November 2017, we initiated a plan for the Resources Lead in the Human Research Program (HRP) to work closely with the TRI team to increase program scrutiny of the financial reports submitted by Baylor.

Estimated Completion Date: The HRP plan will be in-place by January 31, 2018.

We have reviewed the draft report for information that should not be publicly released. As a result of this review, we have not identified any information that should not be publicly released.

Once again, thank you for the opportunity to review and comment on the subject draft report. If you have any questions or require additional information regarding this response, please contact Sharon Thomas on (281) 244-7668.

Ellen Ochoa

Ellen Ochoa

3 Enclosures:
1. BH4-09-412 "NSBRI Request to Use Core Funds to Establish a CRF"
2. BH4-10-220 "NSBRI Approval to Use Core Funds to Establish a CRF"
3. SA-17-113 "NSBRI Consolidated Research Facility-Center for Biomedical Innovation"

cc:
HQ/Associate Administrator for Human Exploration and Operations Mission Directorate/
W. H. Gerstenmaier
HQ/Assistant Administrator for Procurement/W. P. McNally

APPENDIX D: NSBRI'S COMMENTS

Baylor College of Medicine

Brookhaven National Laboratory

Harvard Medical School

The Johns Hopkins University

Massachusetts Institute of Technology

Morehouse School of Medicine

Mount Sinai School of Medicine

Rice University

Texas A&M University

University of Arkansas for Medical Sciences

University of Pennsylvania Health System

University of Washington

January 12, 2018

To: Jim Morrison
Assistant Inspector General for Audits
NASA Office of Inspector General

From: Jeffrey P. Sutton, M.D., Ph.D.
Former Director
National Space Biomedical Research Institute

Subject: Response to NASA Office of Inspector General (OIG) Draft Report, "Audit of National Space Biomedical Research Institute" (A-17-001-00)

The National Space Biomedical Research Institute (NSBRI) appreciates the opportunity to review your draft report entitled "Audit of National Space Biomedical Research Institute" (A-17-001-00).

In the report, the OIG makes a number of findings and four recommendations, where each recommendation is addressed to the Director of Johnson Space Center (JSC). NSBRI, as a non-governmental organization, is pleased to indicate concurrence or non-concurrence with the report's findings which follow.

NSBRI Made Progress Toward the Overall Goals of the Cooperative Agreement

NSBRI Response: Concur.

NASA cooperative agreement NCC 9-58 between JSC and Baylor College of Medicine (BCM), the lead NSBRI consortium institution, was signed in April 1997 and ended in September 2017, following the execution of a maximum of three five-year optional extensions to the initial five-and-half-year award period. The bold, forward-looking mission of NSBRI, as set forth by NASA, and the institute's evolving strategic goals were achieved through strong leadership, the ability to engage a dynamic network of top-tier biomedical investigators nationally (many of whom were new to NASA), outstanding resources and a productive partnership with NASA.

In addition to the points noted in the report, NSBRI maintained a sharp focus on deliverables, scientific excellence and collaboration, with projects and investigators organized on distributed, multidisciplinary

research teams aligned with high-priority human health and performance risks associated with space travel. Synergies and integration within and between teams, and with NASA, helped elevate the caliber, productivity and impact of biomedical research and development. To promote operationally-relevant translational research, NSBRI utilized a User Panel of current and former astronauts and flight surgeons who interfaced with NSBRI management, team leaders, investigators and NASA personnel. Moreover, in many areas such as non-invasive portable medical devices, human genomics (and related fields) and clinical trials, NSBRI served a pathfinder role for NASA and brought new capabilities to further understand and mitigate risks on the former Bioastronautics Roadmap and current Human Research Roadmap.

NSBRI also cultivated an effective Industry Forum that supported innovative products having dual uses for space and Earth, and the institute adopted new strategies and methods to accelerate products through research, development, testing and evaluation toward operational integration. Furthermore, NSBRI's award-winning education programs contributed substantially to the institute's science and technology portfolio as well as to the training of a new generation of space biomedical scientists, engineers, physicians and leaders. Given the depth and breadth of NSBRI achievements and the diligent collaborative work of many over the years, it is appreciated that your report concluded that "NSBRI played an important role in improving NASA's knowledge of human physiological responses to space travel and in developing research to help the Agency mitigate the most serious human health and performance risks during its 20-year, $484 million cooperative agreement with NASA."

NASA's Future Plans for Biomedical Research

NSBRI Response: Partially concur.

Since its inception in 2005, NASA's Human Research Program (HRP) has matured in its organization of research elements and administrative capabilities to manage a diverse portfolio of biomedical research grants aimed at mitigating risks on the Human Research Roadmap. NSBRI agrees with the report that HRP has evolved and has processes to attract external researchers, issue solicitations, evaluate proposals, monitor sub-recipients and perform other tasks associated with traditional grant management. It is important to leverage HRP and other NASA capabilities whenever possible and avoid unnecessary duplication of effort.

Identifying and managing external investigators are important components for programs in space biomedical and other areas of research. However, HRP and NSBRI adopted different yet complementary approaches that together added value to the Agency. HRP focused its main strategy on incremental research awards to institutions where most investigators worked independently with arms-length interactions and oversight from HRP element managers. This is a time-honored approach. In contrast, outside institutes such as NSBRI and the Translational Research Institute for Space Health (TRI) develop alternative strategies to help HRP achieve its mission. They are smaller and more nimble organizations than the government, and it is often easier to promote innovation and implement new programs and processes. The diminution of the role of external institutes like NSBRI or TRI may decrease overall program effectiveness for NASA.

In the case of NSBRI, the institute utilized a team-based approach where all research projects, including postdoctoral fellowships, were assigned to interdisciplinary virtual research teams under the direction of team leaders competitively selected from among NSBRI-funded investigators. Team leaders reported to NSBRI's Chief Scientist, provided monthly updates on projects within and between teams, and served as a valuable resource for NSBRI and NASA. The team-based approach also allowed knowledge to be leveraged across new incoming and seasoned researchers, thereby increasing efficiency. NSBRI's small management team and User Panel worked closely and directly with investigators and the teams to accelerate deliverables to NASA. Management also used its extensive knowledge, experience and connections to mobilize resources within the medical community locally and nationally to conduct rapid clinical trials in ways not otherwise accessible to HRP. The institute embraced new ways of doing business and a portion of its portfolio was for high-risk high-payoff endeavors, such as the Space Medical and Related Technologies Commercialization Assistance Program.[1] Furthermore, NSBRI implemented cost sharing on all of its projects and raised considerable non-federal funds, thereby increasing the return on investment of federal dollars and allowing NSBRI to participate in, and obtain seminal research findings from, unique international opportunities such as the 520-day study of the MARS 500 Project where NASA was not able to participate.[2]

NSBRI Charged Improper and Unreasonable Expenses to the Cooperative Agreement

NSBRI Response: Do not concur.

Consolidated Research Facility

The concept for a Consolidated Research Facility (CRF), to be shared by NSBRI and the Center for Space Medicine at BCM, grew from positive discussions within NSBRI and with HRP. The CRF would transform the virtual institute by providing three reconfigurable laboratories and other space to demonstrate progress, as well as to test, evaluate and accelerate deliverables from NSBRI's science and technology portfolio, which averaged 60 research projects at any given time. The facility would promote on-site interactions and collaborations among investigators, teams, User Panel members, Industry Forum companies, trainees and others. It would enable NSBRI management and the NASA customer to have coordinated hands-on project assessments through advanced technology demonstrations, investigator briefings and scholarly presentations, with the opportunity to provide timely feedback and redirection if needed. Management's small administrative footprint would remain unchanged in moving NSBRI headquarters from the BCM/Houston Methodist Hospital location to the CRF.

The potential return on investment of the CRF was determined in the context of funding two or three fewer research projects per year and adding significant capabilities, resources and support to the remaining projects in the portfolio. Other benefits, such as providing educational programs on-site and elevating the visibility and importance of space biomedical research to a broad community, were acknowledged but the strategic rationale was to enhance the delivery of

[1] The innovations and successes of this program, which required 100% cost sharing, were shared with the OIG auditors. http://nsbri.org/wp-content/uploads/2016/02/NSBRI-IF-smartcap-portfolio-web1.pdf

[2] *Proc Natl Acad Sci USA*. 2013;110(7):2635-2640

research products to help NASA mitigate human health and performance risks in accord with NSBRI's mission.

Plans for the CRF were vetted with the NSBRI External Advisory Council and approved by the NSBRI Board of Directors. They were endorsed by the HRP Manager and the NASA Contracting Officer's Technical Representative (COTR), and subsequently approved by the NASA Contracting Officer (CO) for NSBRI. Formal documentation, meetings and approval for the CRF were provided to the OIG during the audit.[3,4]

The estimated costs for CRF build-out and operations were consistent with actual costs incurred as summarized in your report. The CRF was transformative for NSBRI and met all of its objectives. Despite substantial year-over-year reductions in the NSBRI budget from FY 2013 to FY 2017, research productivity and deliverables remained high and the ratio of co-investigators to principal investigators grew by 25%, indicative of an increase in collaborations. It was the consensus view across the research community that the CRF substantially improved NSBRI performance and scientific output of operationally-relevant products. NSBRI does not concur with the finding that $7.8 million could have been used for additional biomedical research since much of the cost associated with the CRF was effectively put into augment capabilities for NSBRI research and subsequent deliverables to NASA.

Meeting and Travel Expenses

NSBRI utilized 2CFR §200.432 guidance on conferences in addition to its own policy on supporting meetings. In reviewing reasonableness, NSBRI considered cost and efficiency, including location, availability, time constraints, non-local travel and overall savings. For all vendors, pricing/quality/efficiency were reviewed with BCM prior to a purchase order being created and services/goods rendered. NSBRI also reviewed all service contracts with terms and conditions with BCM finance, purchasing and legal offices. Below are NSBRI's reasons for non-concurrence with the report findings.

Nikkos Worldwide Chauffeured Services (Nikkos): The institute scheduled an event in Washington, D.C., in October 2013 to highlight NSBRI achievements through interactive science and technology demonstrations and exhibits in the Capitol Visitor Center. To save costs, NSBRI planned to concurrently hold meetings of its Board of Directors and External Advisory

[3] (1) 11/23/09 - NSBRI letter and documentation on justification, location and economics were sent to the COTR requesting review and approval for the build-out and rental expense of the CRF. Both the HRP Manager and CO were copied on the letter; (2) 12/18/09 - CO approval letter to support direct cost expenses to complete necessary studies to (a) obtain final costs estimates and (b) build out and lease space in the BioScience Research Collaborative in FY 2010; (3) 6/10/10 - NSBRI met with the COTR and CO at JSC to present a letter and packet containing detailed architectural studies, lease terms, build-out estimates and cost savings (through negotiations, NSBRI achieved (a) $1.9M in lease cost reductions for NASA, a 21% improvement and (b) an additional $0.9M savings via rent concessions during the build-out ($0 rent paid)). The HRP Manager was copied on the letter and packet that were presented; 6/15/10 - CO approval letter to proceed with the design, development and construction phase of the CRF and to initiate execution of the lease agreement.

[4] The 12/18/09 - CO approval letter stated that the CRF justifications "appear to be highly beneficial for the future of NSBRI" and that "the emphasis of this facility on interdisciplinary collaboration bridging science, medicine and engineering brings great opportunity for collaboration and is very much in line with NASA's own goals and our expectations of the NSBRI."

Council. The demonstrations required that personnel, along with a significant amount of specialized and bulky technical equipment, needed to converge from a hotel to the Capitol Visitor Center during a small time window, pass through security, go through a timely set-up and then leave quickly once the event was completed. While the usual mode of ground transportation for NSBRI was cabs, the logistics dictated that specialized transportation was needed for this event. Nikkos, a negotiated service provider for BCM, was contracted by NSBRI to provide transportation for the demonstrations and meetings. NSBRI would then receive one consolidated bill and save on labor costs, rather than processing 100+ separate receipt reimbursements. Unfortunately, there was a government shutdown and hotels, flights and ground transportation arrangements could not be cancelled without significant penalty. NSBRI opted to proceed with its board and council meetings to ensure that business objectives of the institute were met, and rescheduled the demonstrations and next Board of Directors meeting in Washington, D.C., in March 2014. NSBRI does not concur that $16,484 of the amount Nikkos billed NSBRI was unreasonable because of the multiple factors discussed above.

City Kitchen: The finding that $3,665 was deemed unreasonable includes costs for three separate meetings. As discussed during the onsite audit and also in submitted documentation, NSBRI incurred costs for food and set-up due to onsite catering for working session lunches. These reduced the need for travelers to stay extra days for meetings and minimized hotel and per diem costs. NSBRI hosted research demonstrations, student posters and guest speakers during these meetings that pertained to the Board of Directors and External Advisory Council. The attendance of board and council members is correctly noted in the report but it does not include the researchers, students, speakers and other invited personnel who participated in the meetings.

Hotel ZaZa: The finding that $21,639 was deemed unreasonable includes costs for three separate meetings pertaining to the NSBRI Board of Directors and External Advisory Council. Due to the limited availability of board and council members, NSBRI conducted meetings over meals to save on costs and limit the need for travelers to stay extra days. Hotel ZaZa is one of the local hotels BCM has a contract with. It can accommodate groups of various sizes and is close to NSBRI headquarters, minimizing travel time and expenses. Expenses paid to the hotel were for breakfasts prior to meeting at NSBRI headquarters, working dinners with presentations, audio visual equipment (not mentioned in the report) and service charges/fees. In addition to the number of board and council attendees noted in the report, other personnel such as guest speakers, team leaders, trainees and staff also attended the presentations held at every dinner.

Once again, thank you for the opportunity to review and comment on the subject draft report. If you have any questions or require additional information regarding this response, please do not hesitate to contact me at (713) 798-7639.

Sincerely,

Jeffrey P. Sutton

Jeffrey P. Sutton, M.D., Ph.D.

c: Sharon Thomas, Audit Liaison Representative for NASA JSC
Paul Roberts, Audit Liaison Team Lead, Mission Support Directorate, NASA

APPENDIX E: REPORT DISTRIBUTION

National Aeronautics and Space Administration

Administrator
Deputy Administrator
Associate Administrator
Chief of Staff

Non-NASA Organizations and Individuals

Office of Management and Budget
    Deputy Associate Director, Energy and Space Programs Division

Government Accountability Office
    Director, Office of Acquisition and Sourcing Management

Congressional Committees and Subcommittees, Chairman and Ranking Member

Senate Committee on Appropriations
    Subcommittee on Commerce, Justice, Science, and Related Agencies

Senate Committee on Commerce, Science, and Transportation
    Subcommittee on Space, Science, and Competitiveness

Senate Committee on Homeland Security and Governmental Affairs

House Committee on Appropriations
    Subcommittee on Commerce, Justice, Science, and Related Agencies

House Committee on Oversight and Government Reform
    Subcommittee on Government Operations

House Committee on Science, Space, and Technology
    Subcommittee on Oversight
    Subcommittee on Space

(Assignment No. A-17-001-00)