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AUDIT REPORT

OFFICE OF AUDITS

AUDIT OF NASA'S RECOVERY ACT PROCUREMENT ACTIONS AT JOHNSON SPACE CENTER, GODDARD SPACE FLIGHT CENTER, LANGLEY RESEARCH CENTER, AND AMES RESEARCH CENTER

OFFICE OF INSPECTOR GENERAL

National Aeronautics and
Space Administration

REPORT NO. IG-10-017 (ASSIGNMENT NO. A-09-009-05)

Final report released by:

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Inspector General

Acronyms

GIC	Grant Information Circular
GPM	Global Precipitation Measurement
HECC	High End Computing Capability
JWST	James Webb Space Telescope
NOAA	National Oceanic and Atmospheric Administration
OIG	Office of Inspector General
OMB	Office of Management and Budget
PIC	Procurement Information Circular
TSIS	Total and Spectral Solar Irradiance Sensor
UPWT	Unitary Planned Wind Tunnel
WRAP	Wildfire Research and Applications Partnership

OVERVIEW

AUDIT OF NASA'S RECOVERY ACT PROCUREMENT ACTIONS AT JOHNSON SPACE CENTER, GODDARD SPACE FLIGHT CENTER, LANGLEY RESEARCH CENTER, AND AMES RESEARCH CENTER

The Issue

The American Recovery and Reinvestment Act of 2009 requires an unprecedented level of transparency and accountability to ensure that Recovery Act funds are expended in accordance with the requirements of the Act and to make information about these expenditures readily available to the public. In support of these objectives, the Act requires Federal Offices of Inspector General to assess their agency's compliance with the Recovery Act provisions set forth in the Office of Management and Budget's Implementing Guidance[1] (OMB Guidance), which details requirements that Agencies must follow in awarding and modifying contracts, grants, and cooperative agreements using Recovery Act funds. In addition to the OMB Guidance, NASA developed new Procurement Information Circular (PIC) and Grant Information Circular (GIC) to provide additional guidance for contract, grant, and cooperative agreement actions using Recovery Act funds.

The NASA Office of Inspector General (OIG) examined Recovery Act-funded procurement actions NASA awarded from February 17, 2009 (when the Recovery Act was enacted), through November 30, 2009. We reviewed contracts, cooperative agreements, and contract modifications to determine NASA's compliance with Recovery Act requirements and with NASA and OMB guidance. We performed our audit work at four NASA Centers, reviewing 28 procurement actions totaling $432 million in Recovery Act funds. The procurement actions involved 11 programs, projects, and activities (see Table 1).

[1] Office of Management and Budget, "Updated Implementing Guidance for the American Recovery and Reinvestment Act of 2009" (M-09-15, April 3, 2009).

Table 1. Recovery Act-Funded Awards to 11 NASA Programs and Projects		
NASA Center	**Contract Amount (million)**	**Recipient Program/Project**
Johnson	$201.3	• Cross-Agency Support: Institutional Investments Program • Orion Project
Goddard	$193.5	• Landsat Data Continuity Mission • Global Precipitation Measurement (GPM) Project • Glory Project • NASA/NOAA Climate Sensors Investment: Total and Spectral Solar Irradiance Sensor (TSIS) Instrument • James Webb Space Telescope (JWST) Project
Langley	$21.2	• NASA/NOAA Climate Sensors Investment: Clouds and the Earth's Radiant Energy System Flight Module 6 (CERES FM6) Instrument
Ames	$16.3	• Unitary Plan Wind Tunnel (UPWT) Facility Upgrade Project • High-End Computing Capability (HECC) Project • Wildfire Research and Applications Partnership (WRAP) Activity

For each of the awards and modifications, we analyzed the contract and cooperative agreement files and reviewed each Center's process for modifying the contracts and awarding the cooperative agreement under the Recovery Act requirements outlined in the OMB and NASA guidance. Details of the audit's scope and methodology are in Appendix A.

Results

Of the 28 procurement actions we reviewed, all 28 complied with the OMB Guidance. However, 3 of the procurement actions did not fully comply with NASA guidance governing the use of Recovery Act funds.

Specifically, we found that the contract modification files for the Orion Project at Johnson Space Center and the Landsat Data Continuity Mission at Goddard Space Flight Center did not contain all of the supporting documentation to demonstrate that the negotiations had taken place between NASA and the respective contractors for the Recovery Act work. NASA's PIC[2] states that contracting officers shall document negotiations for Recovery Act work in the contract file. NASA procurement staff told us that they conducted negotiations with the Orion and Landsat Data Continuity Mission contractors but did not fully document these negotiations in the contract file because they believed conducting verbal/e-mail negotiations was sufficient. However, by not fully documenting the negotiations in the contract file NASA officials do not have all of the evidence to support that they communicated to the contractor that this portion of the work

[2] NASA Procurement Information Circular 09-06D, "Contracting With Recovery Act Funds," October 15, 2009.

would be paid for using Recovery Act funds. As a result, NASA runs the risk that Recovery Act funds expended on the Orion Project and Landsat Data Continuity Mission may not be used for their intended purpose.

The third procurement action that did not fully adhere to NASA guidance pertained to the award of a cooperative agreement. In this case, Ames Research Center (Ames) procurement staff did not require California State University-Monterey Bay[3] (California State) to submit an updated schedule of Recovery Act task milestones with their revised proposal for the Wildfire Research and Applications Partnership Activity funded with Recovery Act funds. California State originally submitted a proposal for non-Recovery Act NASA funds to conduct research in collaboration with NASA to improve wildfire response. The proposal was not selected for award. When Recovery Act funds became available, Ames awarded a cooperative agreement based on the previously submitted proposal.[4] Ames and California State agreed to a two year period of performance, however, Ames did not direct California State to file a Recovery Act task schedule to reflect the new milestones and period of performance. NASA's GIC, which applies to grants and cooperative agreements, states that NASA should require updated proposals that include the minimal amount of detail necessary to execute an award. Ames procurement personnel did not require California State to file an updated schedule because, in their view, it was not a necessary element of the revised proposal and was not specifically required by the GIC. However, without an updated schedule to demonstrate Recovery Act task milestones, Ames would not have a key element with which to measure California State's performance. Since NASA may award up to 10 cooperative agreements to other Recovery Act recipients, it is imperative that updated schedules be required for all cooperative agreement awards to ensure accountability and transparency.

Subsequent to our review, Ames provided the OIG with a copy of the updated schedule they received from California State, reflecting the new period of performance for the cooperative agreement.

Management Action

To ensure accountability and transparency in the use of Recovery Act funding, we recommend that NASA's Recovery Act Implementation Executive require that the Orion Project and Landsat Data Continuity Mission fully comply with requirements to document all contract negotiations in writing and include the documentation in the contract file. We also recommend that the Recovery Act Implementation Executive

[3] The cooperative agreement was awarded to The University Corporation at Monterey Bay on behalf of California State University-Monterey Bay.

[4] NASA Grant Information Circular 09-03A, "Implementation of the American Recovery and Reinvestment Act of 2009," August 28, 2009. The GIC states that Recovery Act funds may be used to fund proposals not previously awarded provided the date of the non-selection decision has not exceeded 6 months. The award of the cooperative agreement to California State University-Monterey Bay was within the 6-month limit.

remind contracting officers of the importance of ensuring that contract negotiations are properly documented.

In addition, we recommend the Recovery Act Implementation Executive require grant officers to obtain a schedule of milestones or other appropriate documentation to ensure that the awardee is measured against the accountability aspects of the Recovery Act and to demonstrate that the awardee understands the terms and conditions of the Recovery Act award.

In NASA's response to our draft report, received July 23, 2010, the Recovery Act Implementation Executive states that the Agency generally concurs with the observations noted in this report and has taken action to address our recommendations to include adding the requisite documentation to the procurement files.

However, the response also indicates the Agency has concerns with one of our observations, which states that without proper documentation to support negotiations with the contractors, Recovery Act funds might not be used for their intended purpose. NASA believes that detailed negotiations and the execution of the contract modifications by both parties results in minimal risk that Recovery Act funds would not be used for their intended purpose. Further, NASA feels if the funds were not used for their intended purpose, the contractor would be in default.

While we understand the Agency's concerns, we believe maintaining complete documentation of all negotiations in the contract files provides evidence of the specific tasks agreed upon between NASA and the contractor. Such documentation would also assist in supporting NASA's position should a dispute arise with the contractors at a later date, thereby protecting the interests of the Agency.

The Recovery Act Implementation Executive's actions are responsive to our recommendations. Therefore, the recommendations are resolved and we will close the recommendations upon verifying proper implementation of the recommended corrective actions.

CONTENTS

INTRODUCTION

Background

On February 17, 2009, the American Recovery and Reinvestment Act of 2009 (Recovery Act) was signed into law. The Recovery Act seeks to strengthen the U.S. economy through the creation of new jobs, spur technological advances in science and health, and invest in infrastructure to provide long-term benefits. The Recovery Act also requires an unprecedented level of transparency and accountability to ensure that Recovery Act funds are expended in accordance with the requirements of the Act and to make information about the expenditure of Recovery Act funds readily available to the public.

NASA received $1 billion under the Recovery Act, allocated to the following mission areas:

- Science: $400 million to accelerate the development of the tier 1 set of Earth Science climate research missions recommended by the National Academies Decadal Survey and to increase the agency's supercomputing capabilities.

- Aeronautics: $150 million for system-level research, development, and demonstration activities related to aviation, safety, environmental impact mitigation, and the Next Generation Air Transportation System.

- Exploration: $400 million to develop safe and robust capabilities for human space exploration and to stimulate efforts within the private sector to develop and demonstrate technologies that enable commercial human spaceflight capabilities.

- Cross-Agency Support: $50 million to restore NASA-owned facilities damaged by natural disasters in 2008.

We examined 28 procurement actions awarded to 11 programs, projects, and activities totaling $432 million in new contracts, cooperative agreements, and modifications to existing contracts funded with Recovery Act funds. Our audit locations included the Johnson Space Center, Goddard Space Flight Center, Langley Research Center, and Ames Research Center. Table 2 identifies the programs/projects we reviewed at each Center. See Appendix B for a more detailed description of the programs and projects examined in this review.

Table 2. Recovery Act Procurement Actions Reviewed				
NASA Center	**Mission Area**	**Program/Project**	**Types of Procurement Actions Reviewed**	**Amount (million)**
Johnson	Cross-Agency Support	Cross-Agency Support: Institutional Investments Program	8 newly awarded contracts 5 contract modifications	$35.4
	Exploration	Orion Project	1 contract modification	$165.9
Goddard	Science/ Earth Science	Landsat Data Continuity Mission	3 contract modifications	$44.2[5]
		Global Precipitation Measurement Project	2 contract modifications	$32.0
		Glory Project	1 contract modification	$16.0
		NASA/NOAA Climate Sensors Investment: Total and Spectral Solar Irradiance Sensor	1 contract modification	$26.3
	Science/ Astrophysics	James Webb Space Telescope Project	2 contract modifications	$75.0
Langley	Science/ Earth Science	NASA/NOAA Climate Sensors Investment: Clouds and the Earth's Radiant Energy System Flight Module 6 (CERES FM6) instruments	1 contract modification	$21.2
Ames	Aeronautics	Unitary Planned Wind Tunnel Facility	1 contract modification	$9.0
	Science/ Earth Science	High-End Computing Capability Project	2 contract modifications	$6.0
		Wildfire Research and Applications Partnership Activity	1 newly awarded cooperative agreement	$1.3
Total				**$432.3**

Source: NASA Recovery Act Contract Files

Objectives

Our overall audit objective was to determine whether NASA awarded contracts, cooperative agreements, and contract modifications in compliance with the Recovery Act provisions set forth in OMB and NASA guidance for grants and procurements.

Specifically, we examined whether NASA

- properly posted funding opportunities to the NASA and Recovery.gov Web sites;
- structured award documents to result in meaningful and measurable outcomes consistent with goals of the Recovery Act;
- included the appropriate Recovery Act clauses on the contract, contract modification, and cooperative agreement award documents;
- executed Recovery Act awards in a timely manner;

[5] The Landsat Data Continuity Mission received $63.4 million in Recovery Act funds. At the time of our review, $44.2 million had been awarded.

- documented justification for the type of contract awarded and ensured the justification aligned with contract objectives and Recovery Act goals; and
- properly awarded and justified any contract that was other than competitively awarded.

See Appendix A for details of the audit's scope and methodology, our review of internal controls, and a list of prior audit coverage.

THREE RECOVERY ACT PROCUREMENT ACTIONS DID NOT FOLLOW NASA GUIDANCE

Based on our review of 28 procurement actions, we determined that NASA's Recovery Act-funded awards generally complied with OMB and NASA guidance, although we identified 3 procurement actions that did not fully comply with NASA guidance. For each contract action, we reviewed the contract file to ensure that, when practical, firm-fixed-price contracts were awarded, contracts were competed, and small business participation was considered. We noted that 6 of the 28 procurement actions were not competitively awarded; however, these awards were properly justified. The 6 procurement actions were awarded to small disadvantaged businesses and had contract values of less than the $3.5 million threshold that requires competition according to Federal regulations.[6] We also reviewed the contract files to ensure they contained appropriate Recovery Act clauses in the award documents; that the contract requirements, including cost and schedule information, were separate for each Recovery Act action; and that each NASA Center complied with the requirements for the pre-award and pre-solicitation process outlined in the OMB Guidance and NASA Circulars. In addition, we reviewed the contract and contract modification files to ensure the Recovery Act tasks identified could be easily tracked and segregated from work funded by non-Recovery Act funds. Finally, we reviewed the contract modification files for documentation of communications between NASA procurement officials and the respective contractors regarding their ability to perform the work while adhering to the terms of the Recovery Act.

Two Contract Negotiations Did Not Fully Comply With NASA Guidance

Two of the 28 contract files we reviewed did not contain full documentation of negotiations between NASA and the contractor to modify Recovery Act-funded procurement actions. Specifically, the contract files for the Orion Project at Johnson and the Landsat Data Continuity Mission at Goddard did not contain all of the supporting documentation of the negotiations held between NASA and the respective contractors regarding the work to be performed. Procurement officials for both projects explained that they had conducted multiple negotiations with the contractors regarding the scope and cost of the Recovery Act work; however, they did not document these negotiations in the contract modification files. NASA's Procurement Information Circular[7], states that contracting officers shall document negotiations for Recovery Act work in the contract

[6] Federal Acquisition Regulation (FAR), Part 19.805-1.

[7] PIC 09-06D, "Contracting With Recovery Act Funds," October 14, 2009.

file. Specifically, section 3, paragraph e, states that negotiation documents, which might include a detailed pre- and post-negotiation memorandum for large, new awards, or a memorandum to the file for modifications to existing awards, shall indicate that pricing of work to be performed with Recovery Act funds was negotiated or agreed upon as a stand-alone effort that is separately identifiable.

Project personnel stated that they were unaware of the requirements for documenting the negotiations in a written summary and believed that verbal or e-mail negotiations sufficed because the procurement actions were modifications to existing contracts and the scope and pricing of the work was outlined in the contract modification document. However, because they did not document these verbal or e-mail negotiations in the contract file, NASA officials did not have the necessary supporting documentation that NASA staff communicated to the contractor that this portion of the work would be performed using Recovery Act funds. Subsequently, the Orion Project and Landsat Data Continuity Mission run the risk that Recovery Act funds may not be used for their intended purpose.

One Cooperative Agreement Did Not Fully Comply with NASA Guidance

California State University-Monterey Bay (California State) originally submitted a proposal for the Wildfire Research and Applications Partnership (WRAP) Activity in response to a NASA Broad Agency Announcement.[8] However, the proposal was not selected for award at the time of original submission. When Recovery Act funds became available, Ames Research Center awarded a cooperative agreement to California State based on the previously submitted proposal. NASA policy states that Recovery Act funds may be used to fund proposals not previously awarded provided the date of the non-selection decision has not exceeded 6 months. In addition, the recipient must agree to all terms and conditions required by the Recovery Act and must be provided a reasonable opportunity to revise its proposal. If these conditions are met, the grant or cooperative agreement is determined to be awarded competitively. We verified that the date of non-selection had not exceeded the 6-month time limit, that there was adequate documentation showing California State agreed with all Recovery Act clauses and conditions, and they had the opportunity to revise their proposal. However, the cooperative agreement did not contain a revised schedule that would allow NASA to measure performance.

We reviewed the revised proposal submitted by California State in relation to the Recovery Act portion of the cooperative agreement. Ames and California State agreed to a 2-year period of performance, however, the table with the specific activities and dates for when these activities would be accomplished had not been updated to reflect the new period of performance. NASA's Grant Information Circular[9] states that NASA should

[8] Broad Agency Announcement is a competitive solicitation procedure used to obtain proposals for basic and applied research not related to the development of a specific system or hardware procurement.

[9] GIC 09-03A, "Implementation of the American Recovery and Reinvestment Act of 2009," August 28, 2009.

request updated proposals that include the minimal amount of detail necessary to execute an award. Ames procurement personnel stated that California State did not submit a revised schedule with their revised proposal. In the view of Ames procurement personnel, the schedule was not a necessary element of the revised proposal. Ames procurement personnel explained that they measure performance against the project objectives listed in the proposal and require the recipient to provide monthly progress reports. They also stated that the nature of the cooperative agreement requires NASA to have an integral role in the work and, in complying with that requirement, they will monitor California State's achievement of the milestones throughout the period of performance.

We believe the updated schedule is an integral part of the cooperative agreement because the schedule is a necessary metric for Ames to use in measuring performance and ensuring California State is successfully completing activities and objectives funded with Recovery Act funds. Without an updated schedule, the ability of Ames procurement personnel to measure performance against milestones is impaired.

Subsequent to our review, Ames procurement personnel provided the OIG with a copy of the updated schedule from the California State University-Monterey Bay reflecting the new period of performance for the cooperative agreement. Since the schedule is an integral part of the cooperative agreement, we believe NASA should ensure that schedules are included as a part of all future awards proposals.

Federal and NASA Recovery Act Guidance

OMB Guidance. OMB Guidance[10] details specific requirements for awarding contracts under the Recovery Act. The guidance emphasizes the importance of contract type, competition, and small business participation as well as the unique transparency requirements for the pre-award and pre-solicitation process. Specifically, OMB Guidance requires the use of firm-fixed-price contracts and competition to the maximum extent possible. Firm-fixed-price contracts provide maximum incentive for the contractor to control costs and perform effectively. Contractors competing for contracts saves taxpayer money, improves contractor performance, curbs fraud, and promotes accountability for results. The Guidance allows agencies to use contract types other than firm-fixed-price and to award contracts on a non-competitive basis; however, the agencies must document the reasons for doing so and post this justification on Recovery.gov. Under OMB Guidance, agencies must provide maximum practicable opportunities for small businesses to compete for contracts and to participate as subcontractors in contracts awarded by agencies. Finally, pre-solicitation notices and contract awards must be posted on FedBizOpps.gov (https://www.fbo.gov/) and include the word *Recovery* in the title.

[10] OMB, "Updated Implementing Guidance for the American Recovery and Reinvestment Act of 2009," April 3, 2009.

Procurement Information Circular. NASA's PIC 09-06 provides detailed guidance for NASA's procurement community on implementation of the Recovery Act. For example, the Circular contains general principles along with more detailed requirements that contracting officers and other procurement personnel must follow when awarding a contract or modifying an existing contract using Recovery Act funds. In the PIC, the requirements are specified as Pre-award Considerations, Posting Requirements, Reporting Requirements, Audit Rights, Construction Contracts, Communication, and Invoicing. The Agency issues revisions to PIC 09-06, as necessary to provide the latest Recovery Act guidance to NASA procurement officials. The current revision, 09-06G was issued on April 7, 2010.

Grant Information Circular. NASA's GIC 09-03 provides guidance to the grant- and cooperative agreement-issuing community regarding access to Recovery Act funds. The GIC contains general principles along with more detailed requirements that grant officers and other personnel must follow when awarding a grant or cooperative agreement funded with Recovery Act funds. The requirements are identified as General Principles, Requisition Requirements, Pre-Award considerations, Posting Requirements, Special Terms, Communication, and Payment. Each section has more detailed guidance for grant officers.[11]

The GIC requires that grant officers or the requesting office set distinct parameters and measurable performance requirements when generating a requisition to initiate a grant or cooperative agreement using Recovery Act funds. In addition, the GIC states that grant officers and the requesting office must be able to quantify and assess the quality of the research, education, training, or other public outreach effort during the specified increment or parameters and also able to specify performance in a manner that permits evaluation and review of the effort performed. The Agency issues revisions to GIC 09-03 as necessary to provide the latest Recovery Act guidance to NASA procurement officials. The current revision, 09-03B, was issued on December 24, 2009.

Conclusion

Based on our review of 28 procurement actions, we determined that NASA's Recovery Act-funded awards generally complied with OMB and NASA guidance with the exception of 3 actions that did not fully follow NASA guidance.

The contract files for the Orion Project at Johnson and for the Landsat Data Continuity Mission at Goddard did not contain full documentation of the negotiations between NASA and the respective contractors regarding the Recovery Act work. NASA PIC 09-06D states that contracting officers shall document negotiations for Recovery Act work in the contract file. However, the project personnel did not document the verbal or e-mail negotiations in the contract file because they mistakenly believed that the verbal or e-mail negotiations were sufficient to meet the documentation requirement. Because there is no

[11] Grant officers are responsible for overseeing both grants and cooperative agreements.

documentation of the negotiations in the contract files, NASA officials cannot support that the contractors were informed that this portion of the work would be performed using Recovery Act funds. Without proper documentation, the Orion Project and the Landsat Data Continuity Mission cannot ensure that project funds will be used for their intended purposes.

In addition, Ames awarded a cooperative agreement but failed to require the awardee to provide an updated performance schedule. Consequently, Ames did not have measurable criteria to evaluate California State's performance. Subsequent to our review, Ames provided a copy of the updated schedule from California State reflecting the new period of performance for the cooperative agreement. Since NASA may award up to 10 cooperative agreements to other Recovery Act recipients, future cooperative agreement awards should require updated schedules.

Recommendations, Management's Response, and Evaluation of Management's Response

Recommendation 1. The Recovery Act Implementation Executive should require Orion Project and Landsat Data Continuity Mission personnel to comply with requirements to document all contract negotiations involving Recovery Act funds in writing in the contract file.

Recommendation 2. The Recovery Act Implementation Executive should periodically remind contracting officers of the importance of properly documenting contract negotiations.

Recommendation 3. The Recovery Act Implementation Executive should require grant officers to obtain a schedule of milestones or other appropriate documentation to ensure that the awardee is measured against the accountability aspects of the Recovery Act, and to demonstrate that the awardee understands the terms and conditions of the Recovery Act award.

Management's Response. Prior to formally responding to the draft report, NASA provided technical corrections for our consideration and we updated the draft as appropriate. In NASA's response, received July 23, 2010, the Recovery Act Implementation Executive states that the Agency generally concurs with the observations noted in this report and has taken action to address our recommendations to include adding the requisite documentation to the procurement files.

However, the response also indicates that the Agency has concerns with one of our observations, which states that without proper documentation to support negotiations with the contractors, Recovery Act funds expended on the Orion Project and Landsat Data Continuity Mission might not be used for their intended purpose. NASA believes the detailed discussions to negotiate the Recovery Act work with the two contractors and the execution of the contract modifications by both parties results in minimal risk that

Recovery Act funds would not be used for their intended purpose. Further, NASA feels if the funds were not used for their intended purpose, the contractor would be in default.

Evaluation of Management's Response. While we understand the Agency's concerns, we believe maintaining complete documentation of all negotiations in the contract files provides evidence of the specific tasks agreed upon between NASA and the Contractor. Such documentation would also assist in supporting NASA's position should a dispute arise with the contractors at a later date, thereby protecting the interests of the Agency.

The Recovery Act Implementation Executive's planned actions are responsive to our recommendations. Therefore, the recommendations are resolved and we will close the recommendations after verifying proper implementation of the recommended corrective actions.

APPENDIX A

Scope and Methodology

We performed this audit from October 2009 through July 2010 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform our work to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on the objectives. We believe that the evidence obtained during this audit provides a reasonable basis for our findings and conclusions based on our objectives.

We reviewed 28 procurement actions totaling $432 million in Recovery Act funds issued from February 17, 2009, when the Recovery Act was signed, through November 30, 2009. We performed our work at Johnson Space Center, Goddard Space Flight Center, Langley Research Center, and Ames Research Center because these four Centers had the largest number of Recovery Act procurement actions awarded or modified prior to November 30, 2009. The program and projects reviewed at Johnson include the Cross-Agency Support: Institutional Investment Program (8 new contracts and 5 modifications) and the Orion Project (one contract modified). At Goddard, we reviewed the Landsat Data Continuity Mission, Global Precipitation Measurement Project, Glory Project, the Total and Spectral Solar Irradiance Sensor project (part one of an agreement with the National Oceanic and Atmospheric Administration's Climate Sensors Investment), and the James Webb Space Telescope Project (all had modified contracts). At Langley, we reviewed Clouds and the Earth's Radiant Energy System Flight Module 6 (CERES FM6) instruments project (part two of an agreement with NOAA's Climate Sensors Investment) (one contract modified). Finally, at Ames we reviewed the Unitary Plan Wind Tunnel Facility Project (one contract modified), the High-End Computing Capability Project (two contracts modified), and the Wildfire Research and Applications Partnership (WRAP) Activity (one cooperative agreement awarded).

For our audit, we reviewed the following:

- American Recovery and Reinvestment Act of 2009, February 17, 2009
- OMB's "Updated Implementing Guidance for the American Recovery and Reinvestment Act of 2009," April 3, 2009
- Procurement Information Circular (PIC) 09-06D, "Contracting with Recovery Act Funds," October 14, 2009
- Grant Information Circular (GIC) 09-03A, "Implementation of the American Recovery and Reinvestment Act of 2009," August 28, 2009

Computer-Processed Data

We did not use computer-processed data to perform this review.

Review of Internal Controls

We reviewed internal controls as they relate to NASA's process for awarding contracts, grants, and cooperative agreements and modifying contracts for Recovery Act-funded procurement actions. We met with the Recovery Act Implementation Executive and NASA Procurement officials to gain an understanding of NASA's processes for awarding contracts, grants, and cooperative agreements, detailed in the Procurement Information Circular (PIC) and Grant Information Circular (GIC). We reviewed these Circulars to determine whether they documented the internal controls required to award contracts, grants, and cooperative agreements for the Recovery Act, and whether the controls were sufficient to ensure NASA was complying with Recovery Act provisions, OMB Guidance, and NASA policy. We interviewed procurement officials at Johnson, Goddard, Langley, and Ames and asked them to identify the internal control mechanisms in place at the Center level to ensure they were awarding contracts, grants, and cooperative agreements in compliance with the Recovery Act. In addition, we asked them to walk us through the award process and provide supporting documentation to ensure their internal controls were functioning effectively. As discussed in this report, NASA's process for awarding Recovery Act contracts, grants, and cooperative agreements could be improved. Our recommendations, if implemented, will improve the controls over the Recovery Act award process.

Prior Coverage

During the last 5 years, the NASA Office of Inspector General (OIG) and the Government Accountability Office (GAO) have issued two memoranda and four reports of particular relevance to the subject of this report. Unrestricted reports can be accessed over the Internet at http://oig.nasa.gov/audits/reports/FY10 (NASA OIG) and http://www.gao.gov (GAO).

We considered the following memoranda in planning and performing our audit activities:

"Final Memorandum on Analysis of NASA's Final Program-Specific Recovery Act Plans" (IG-10-005, January 5, 2010)

"Final Memorandum on Analysis of NASA's Final Agency-Wide Recovery Act Plan" (IG-10-06, January 5, 2010)

"Final Memorandum on Review of Open Audit Recommendations Affecting Recovery Act Activities" (IG-10-014, May 20, 2010)

The following reports are related to the programs and projects we reviewed in our audit and were all issued within the last 5 years. The recommendations contained in these reports did not have an effect on the Recovery Act programs and projects we reviewed.

Government Accountability Office

"NASA: Assessments of Selected Large-Scale Projects" (GAO-10-227SP, February 2010)

National Aeronautics and Space Administration

"The Landsat Program Is Not Meeting the Goals and Intent of the Land Remote Sensing Policy Act of 1992" (IG-09-021, September 2, 2009)

"Final Memorandum on the Standing Review Board for Orion Crew Vehicle Project" (IG-08-018, April 28, 2008)

"Final Memorandum on Audit of NASA's Global Precipitation Measurement Project" (IG-08-016-R, March 31, 2008)

PROGRAMS/PROJECTS REVIEWED

Johnson Space Center

Cross-Agency Support: Institutional Investments Program. This Program received $50 million in Recovery Act funding to restore NASA-owned facilities damaged by natural disasters in 2008. The goal of the Cross-Agency Support: Institutional Investments Program is to strategically invest funds to meet the Agency's infrastructure needs and assure the availability of critical facilities for the safe and efficient conduct of Agency missions.

According to the Cross-Agency Support Program Manager, the facilities repaired with Recovery Act funds at Johnson in Houston, Texas, are crucial to NASA's human spaceflight missions. These missions include completion of the remaining launches for the Space Shuttle Program, completion of assembly of the International Space Station (ISS), operation and use of the ISS, implementation of the Constellation Program including the Orion Project, and support for the Commercial Crew & Cargo Program.[12]

The activities involve construction work, including repair of roofs and loggia on several dozen buildings at Johnson Space Center. They also include the replacement of leaking windows; waterproofing of exterior building walls; repair of street, parking lot, and sidewalk lights; reconstruction of a hangar at Ellington Field; and securing of a barge dock on Clear Lake.

NASA created nine work packages (repair activities of a similar kind, area, or operation) that will be managed to the same schedule and subject to NASA's standard processes and procedures for construction of facilities. Of the nine work packages, eight were awarded at the time of our review. In addition to these nine work packages, NASA is also awarding modifications to five existing Support Service Contracts to assist NASA with support services that go along with the necessary construction work.

Orion Project. Recovery Act funds for the Exploration Mission Directorate were applied to the Constellation and Commercial Crew and Cargo Programs. Constellation systems currently in the development stage are the Orion Crew Exploration Vehicle (CEV), the Ares I Crew Launch Vehicle (CLV), and supporting mission and ground support systems. The Recovery Act funds were intended to support accelerated testing, procurement, and manufacturing to maximize NASA's ability to meet a March 2015

[12] In February 2010, the President submitted to Congress his FY 2011 budget request for NASA. A key feature is the termination of the Constellation Program at the end of FY 2010. As of the date of this report, Congress has not taken final action on the budget request.

Initial Operational Capability (IOC) date, when the first transport of the crew to the International Space Station (ISS) was planned.

The Orion spacecraft is being designed to carry crewmembers to and from the ISS and on lunar missions. Once in orbit, Orion and its service module will rendezvous and dock with either the ISS or the Altair Lunar Lander and the Ares V Earth Departure Stage, which could propel astronauts on their way to the Moon.

The Orion Crew Exploration Vehicle Project awarded a contract modification for the Recovery Act funded portion of the project under contract number NNJ06TA25CA to Lockheed Martin on August 19, 2009. The total contract modification amount is $165.9 million. In May of 2010 the contract was modified as noted below. The total amount of Recovery Act funds applied to the Orion contract remained $165.9 million.

According to NASA's May 2009 Recovery Act Program Plan for Exploration, from August 2009 through May 2010, NASA applied Recovery Act funds to complete the design of ground test articles, engineering units, test, design and analysis for the Orion project. Elements of this work were originally planned to occur in FY 2011 but were accelerated into FY 2010 to inform the flight design. In May 2010, the planned Orion Project Recovery Act funded content was re-scoped to reduce risk to the completion of planned work for FY 2010, deemed to be higher priority than the originally scoped work that had been accelerated. For the remainder of the award, the Recovery Act funds will be used to fund the majority of the work performed under the Orion Lockheed Martin prime contract from May 29, 2010 to June 25, 2010. This shift in scope also assured the continuation of the Orion development contract further into this fiscal year and the preservation of the associated jobs.

Goddard Space Flight Center

Landsat Data Continuity Mission. The Landsat Data Continuity Mission (LDCM) is a joint NASA-United States Geological Survey (USGS) mission to extend the LDCM system's useful life and incorporate several data collection improvements. The LDCM satellites were designed for observing land surfaces, recording the Earth's surface as seen from space, and providing spatial imagery and data illustrating human-induced large-scale environmental changes. Examples of these changes are the rapid expansion of desert cities like Dubai and Las Vegas; the deforestation of the Amazon rainforest; and the disappearance of the Aral Sea. LDCM-related research has led to the implementation of improved water management techniques, crop insurance fraud reduction, natural disaster relief planning, continental-scale carbon estimates, and extensive cartographic advances.

Efforts to implement LDCM have been ongoing since the launch of Landsat 7 in 1999. The purpose of LDCM is to provide continuity to the Landsat 7 mission. The Landsat series of satellites has provided multispectral data of Earth's surface on a global scale. LDCM has a projected launch date of June 2013 to replace the Landsat 5 and 7 satellites.

The LDCM project received $63.4 million of Recovery Act funds, which NASA is using to continue work on the instruments, including the Thermal Infrared Sensor (TIRS), and spacecraft needed to sustain the more than 35-year record of continuous observations of the Earth provided by Landsat images. Recovery Act funds contributed to the:

- Design, development, and test of:
    - TIRS:
        - Cryocooler
        - Application-Specific Integrated Circuit (ASIC)
        - Programmatic, mission assurance, and engineering support for TIRS
    - Operational Land Imager (OLI)
    - LDCM spacecraft

Global Precipitation Measurement Project. The Global Precipitation Measurement (GPM) mission is one of the next generation of satellite-based Earth science missions that will study global precipitation (rain, snow, and ice). GPM's stated goal is to address the difficulties of measuring precipitation from a ground-based system that can only measure a small area at one time. GPM provides the only practical way to obtain useful regional and global scale precipitation measurements from the vantage point of a space-based remote sensing instrument.

GPM received $32 million in Recovery Act funds for the GPM Microwave Imager (GMI) #1 and GMI #2 instruments. The Recovery Act funding allowed essential near-year rephasing of activities to decrease mission schedule risk. Both were modifications to existing contracts; however, GMI #2 was treated as new contract scope because it involved procurement of additional equipment and starting the development on time. Recovery Act funds will be used to maintain the delivery date of GMI #1 and allow the construction of a second microwave imager GMI #2 as planned. According to Project officials, the funding allows essential near-year rephasing of activities to decrease mission schedule risk and run-out costs on GMI #2.

Glory Project. Glory is a low Earth orbit (LEO) scientific research satellite designed to collect data on the properties of aerosols, including black carbon, in the Earth's atmosphere and climate system and to collect data on solar irradiance for studying the long-term effects on the Earth climate record. The scientific community can use the data in determining whether the temperature increase and climate changes are byproducts of natural events or are human induced. This will enable a greater understanding of aerosols as agents of climate change.

The project received $16 million of Recovery Act funds that were used to modify an existing contract awarded on August 14, 2009. Activities funded under the Recovery Act are those that will take the spacecraft into completion for launch and include efforts to:

- finish remaining work computers for the Payload Interface Processors (PIP);
- complete design, fabrication, test, and delivery additional PIPs;

- complete remaining work on the Observatory to accommodate the new PIPs;
- complete the Glory Ground Systems;
- prepare for Mission Operations of Glory Spacecraft;
- prepare for, pack and ship Glory spacecraft to launch site; and
- conduct launch.

The Recovery Act funds are necessary to maintain the current workforce throughout the planned launch in calendar year 2010.

Climate Change Sensors Investment. The Climate Change Sensors Investment by the National Oceanic Atmospheric Administration (NOAA), at both Goddard and Langley, is part of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project, which is jointly managed by the (NOAA) and NASA.

Due to schedule slippages and cost overruns, in June 2006, NPOESS was restructured and four climate and space environment sensors were removed from the program. A memorandum of understanding (MOU) between NOAA and NASA was executed in February 2008 to initiate studies assessing the impact of restoring two of the climate sensors that play a critical role in assessing climate change data.

NOAA received $48 million of Recovery Act funding for the climate sensor project. In July 2009, NASA and NOAA signed Amendment 2 to the MOU, which authorized NASA to continue the work on the Climate Sensors Investment and transferred the majority of the Recovery Act funding to NASA.

Total and Spectral Solar Irradiance Sensor (TSIS). Through a reimbursable agreement with NOAA, $26.3 million of Recovery Act funding and procurement responsibility was transferred to the Goddard Space Flight Center for work on the Total and Spectral Solar Irradiance Sensor (TSIS) instrument. The TSIS instrument

- measures the total amount of solar energy coming into the Earth's atmosphere, a fundamental element in understanding climate change, and
- helps to better differentiate between the natural and human causes of climate change and monitors the long-term energy shifts related to climate change.

The TSIS instrument is in the development stage.

On February 1, 2010, the White House decided to restructure the larger NPOESS program. However, the NOAA Climate Sensors Investment and the reimbursable agreements under which the Recovery Act funding was transferred to NASA were not impacted by this decision.

James Webb Space Telescope Project. The James Webb Space Telescope (JWST) is NASA's next-generation successor to the Hubble Space Telescope. The JWST is a large, space-based observatory with a 6.5-meter primary mirror optimized for infrared wavelengths, which will complement and extend the discoveries of the Hubble Space

Telescope. The JWST will have longer wavelength coverage and greatly improved sensitivity. The longer wavelengths enable JWST to look further back in time to find the first galaxies that formed in the early Universe, and to look inside dust clouds where stars and planetary systems are forming today. Its scheduled launch date is June 2014. Recovery Act funds for the JWST Project will be used to retain jobs, maintain the schedule of key development activities, and improve the likelihood of launching on the planned date.

JWST received $75 million of Recovery Act funds that will be applied as contract modifications to two major JWST contracts: Northrop Grumman Aerospace Systems ($65 million) and to the University of Arizona ($10 million). The Recovery Act funds were used to continue the work on the project and avoided a work stoppage on the design and development of the ground and space-based portions of the JWST observatory.

Langley Research Center

Climate Sensors Investment. As at Goddard, the Climate Change Sensors Investment at Langley is part of the NPOESS Preparatory Project, which is jointly managed by NOAA and NASA.

Due to schedule slippages and cost overruns in June 2006, NPOESS was restructured. This removed four climate and space environment sensors from the program and degraded four others. A MOU between NOAA and NASA was executed in February 2008 to initiate studies assessing the impact of restoring two of the climate sensors that play a critical role in assessing climate change data.

NOAA received $48 million of Recovery Act funding for the Climate Sensor Investment. In July 2009, NASA and NOAA signed Amendment 2 to the MOU which authorized NASA to continue the work on the Climate Sensors Investment and transferred the majority of the Recovery Act funding to NASA.

Clouds and the Earth's Radiant Energy System Flight Module 6 (CERES FM6) Instrument. Through a reimbursable agreement with NOAA, $21.2 million of Recovery Act funding and procurement responsibility was transferred to the Langley Research Center for work on the Ceres FM6 instrument. The Ceres instrument

- complements the TSIS measurements by providing information on how clouds influence the Earth's energy balance and
- identifies the role of clouds in regulating climate.

The Ceres FM6 instrument is in the development stage.

On February 1, 2010, the White House decided to restructure the larger NPOESS program. However, the NOAA Climate Sensors Investment and the reimbursable

agreements under which the Recovery Act funding was transferred to NASA were not impacted by this decision.

Ames Research Center

Unitary Planned Wind Tunnel (UPWT) Facility. The UPWT Facility at Ames is a major part of NASA's Aeronautics Test Program (ATP). ATP was created to preserve and promote the testing capabilities of one of a comprehensive set of research facilities in the United States. ATP develops and implements a facility investment and divestment plan to fully support the current and long-term missions of NASA, the Department of Defense, and American industry. The UPWT Facility at Ames includes an 11-foot transonic wind tunnel that is used extensively for airframe development and aerodynamic studies and played a vital role in every manned space-flight program, including NASA's Crew Exploration Vehicle. In addition, the UPWT facility includes a 9 foot by 7 foot Supersonic Wind Tunnel that has provided ascent and reentry aerodynamic data for every NASA-designed, manned space-flight program, including NASA's Space Shuttle and Constellation Programs.

Recovery Act funding for the UPWT Facility will be applied to re-activating the Mitsubishi Make-Up Air System. Specific activities include reactivating an existing compressor, repairing tie lines, and replacing feeder cables. These improvements will result in improved tunnel reliability and productivity. Ames awarded a contract modification for the Recovery Act funded portion of the project under its existing Aerospace Testing and Facilities Operations Maintenance (ATOM) contract NNA09DB39C to Jacobs Technology, Inc. on October 14, 2009. The total contract modification amount is $9 million.

High-End Computing Capability Project (HECC). The HECC at Ames is focused around the Columbia supercomputer and the associated network connectivity, data storage, data analysis and visualization, and application software support. The Science Mission Directorate funds and manages the HECC resources, which serve the supercomputing needs of all of NASA's Mission Directorates. Science Mission Directorate funding supports the operation, maintenance, and upgrade of the supercomputing capability, while the Strategic Capabilities Assets Program exercises the oversight and insight functions.

Recovery Act funding for the HECC project at Ames will be applied to two existing tasks: Ames Compute System and Ames Terrestrial Observation and Prediction System (TOPS). The Ames Compute System will increase the supercomputing capability for climate modeling. Ames awarded a contract modification for the Recovery Act portion of this task to Computer Sciences Corporation under contract NNA07CA29C on August 31, 2009. The total contract modification amount is $5.1 million. The TOPS task will help develop specific computing resources for climate impact studies. Ames awarded a contract modification for the Recovery Act portion of this task to Computer Sciences

Corporation under NNA07CA29C on October 14, 2009. The total contract modification amount is $900,000.

Wildfire Research and Applications Partnership (WRAP) Activity. The WRAP Activity is part of the Earth Science-Applied Sciences Program. The program conducts research and development activities with collaborating organizations to use Earth Science observations, data, and research in environmental decision making and resource management. WRAP is a collaborative effort between Ames, California State University, United States Department of Agriculture-Forest Service, and the National Interagency Fire Center. The purpose of the activity is to develop and mature technologies to improve remote sensing capabilities for wildfire research applications.

Recovery Act funding for the WRAP Activity will be focused on the application of NASA technologies to improve wildfire response and management through a collaborative decision environment. NASA and the United States Forest Service developed the Wildfire Collaborative Decision Environment (W-CDE), and Recovery Act funds will be used for research to enhance existing capabilities of the W-CDE to support pre-, active-, and post-fire assessments. NASA awarded a cooperative agreement to California State University-Monterey Bay for this work. The cooperative agreement was authorized on September 30, 2009, for $1.3 million.

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