NASA OFFICE OF INSPECTOR GENERAL

SEMIANNUAL REPORT

OCTOBER 1, 2016–MARCH 31, 2017


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NASA

FROM THE INSPECTOR GENERAL

In anticipation of new Agency leadership and to assist congressional and stakeholder oversight, the Office of Inspector General (OIG) recently examined two of the most contentious, expensive, and longstanding challenges facing NASA: (1) the Agency's efforts to "rightsize" its workforce and facilities and (2) the Agency's plans for human exploration beyond low Earth orbit.

With respect to the first issue, NASA relies on specialized facilities and infrastructure, unique equipment and tools, and a highly skilled civil servant and contractor workforce to accomplish its science, aeronautics, and exploration missions. The Agency's assets are spread across NASA's 10 Centers and include more than 17,000 civil servants, tens of thousands of contractors, and 5,000 buildings and other structures. Over the years, striking the right balance among these various assets has been a top management challenge, with the Agency making several mostly unsuccessful attempts at "rightsizing" its capabilities.

In June 2012, NASA established the Technical Capabilities Assessment Team (TCAT) to identify and assess Agency technical capabilities and make recommendations for investing in, consolidating, or eliminating capabilities based on mission requirements. To institutionalize capability management into its annual planning and budgeting processes, NASA replaced TCAT with the Capability Leadership Model in 2015. In a review summarized on page 35, we assessed NASA's efforts to strategically manage its technical capabilities to ensure the Agency is prepared for current and future missions.

In an audit released in mid-April, the OIG examined NASA's plans for human exploration of Mars. In 2015, the Agency announced its Journey to Mars framework for deep space exploration with crewed missions to the red planet beginning in the 2030s. In addition to the significant technical and health-related challenges of deep space missions, such a venture will be extremely expensive. In light of the enormous costs and challenges and the critical decisions that must be made in the next several years, this review examines NASA's plans for human exploration beyond low Earth orbit in the near-term, mid-term, and long-term.

We hope these two reports, together with our ongoing investigations and audit oversight work, will help inform and improve decision-making at NASA.

This Semiannual Report summarizes the OIG's activities and accomplishments between October 1, 2016, and March 31, 2017. We hope you find it informative.

Paul K. Martin
Inspector General
April 28, 2017


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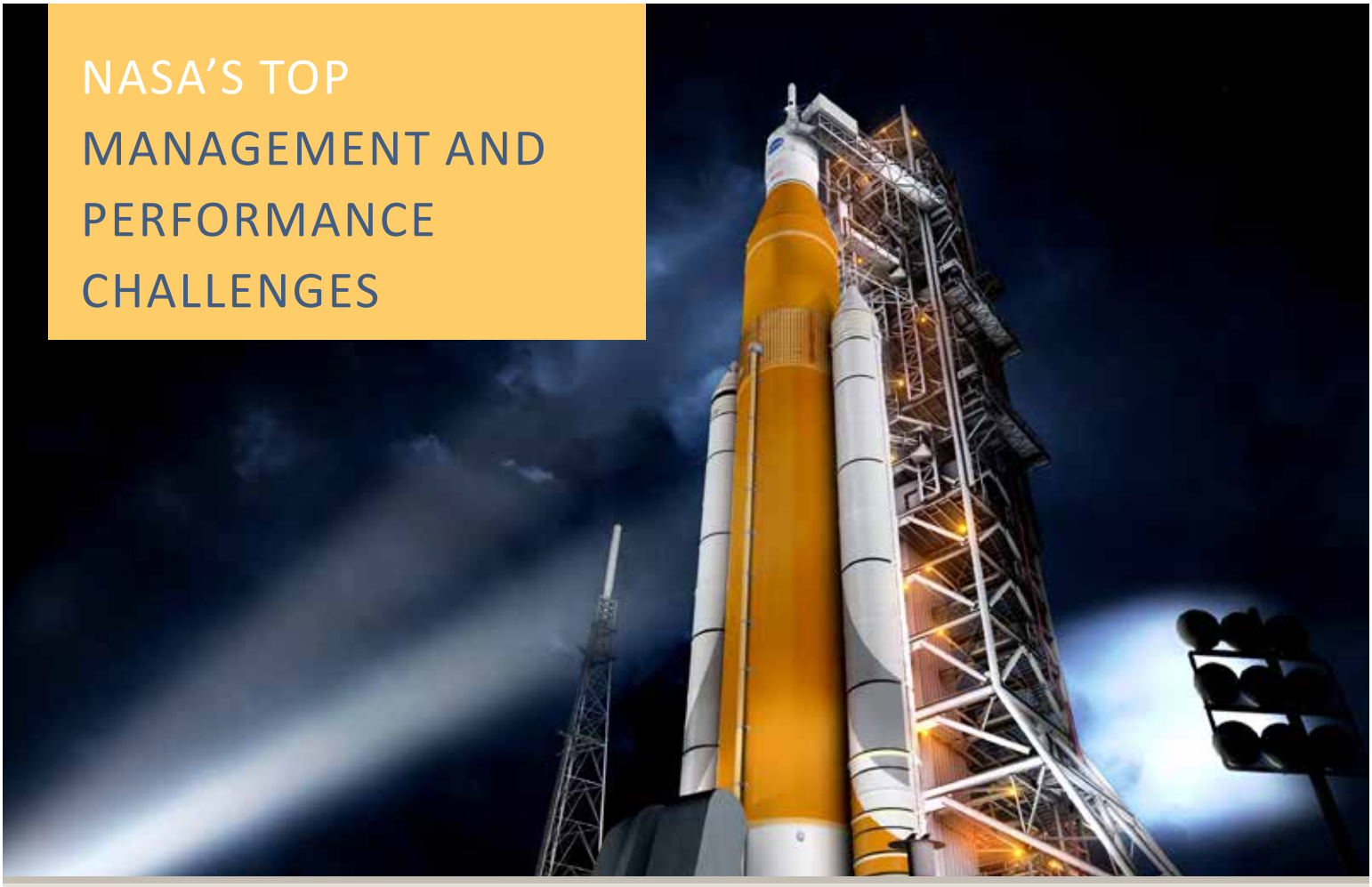
NASA'S TOP MANAGEMENT AND PERFORMANCE CHALLENGES



Artist's rendering of the Space Launch System

As required by the Reports Consolidation Act of 2000, the NASA Office of Inspector General (OIG) annually identifies the most serious management and performance challenges facing NASA. In deciding whether to identify an issue as a top challenge, we considered the significance of the challenge in relation to NASA's mission; whether its underlying causes were systemic in nature; the challenge's susceptibility to fraud, waste, and abuse; and the Agency's progress in addressing the challenge. In our November 2016 report, we identified eight issues as top management and performance challenges facing NASA. Below we provide a summary of each challenge.

POSITIONING NASA FOR DEEP SPACE EXPLORATION

To meet its long-term objective of a crewed mission to Mars, NASA is developing sophisticated rockets, capsules, and related hardware and establishing strategies to mitigate the human health risks posed by extended space flight. However, NASA continues to face challenges in managing the concurrent development of a launch system and crew vehicle and modification of necessary ground systems.

Developing the Space Launch System, Orion, and Related Launch Infrastructure

NASA is developing a new, three-part system to transport astronauts and cargo beyond low Earth orbit: the Space Launch System (SLS), a heavy-lift rocket with an evolvable architecture that can be tailored to accommodate longer and more ambitious missions; the Orion Multi-Purpose Crew Vehicle (Orion), comprised of a crew module, service module, and Launch Abort System; and a ground and launch support program known as Ground Systems Development and Operations (GSDO). NASA is planning the first flight of the integrated SLS/Orion systems – Exploration Mission-1 (EM-1) – for late 2018. NASA's current plan for EM-1 is to launch an uncrewed Orion capsule on a 25 to 26 day journey orbiting the Moon.[1] EM-1 will be followed by Exploration Mission-2 (EM-2), the first crewed mission of the integrated SLS/Orion systems, which NASA hopes to launch as early as 2021.

In a September 2016 audit, we reported the Orion Program has met several key development milestones on the path to EM-2 but much work remains, including evaluating options related to the delayed delivery of the service module being developed by the European Space Agency, continuing mitigation for seven critical risks while operating with a less-than-optimal budget profile for a developmental project, addressing a potential shortfall of $382 million in reserves managed by prime contractor Lockheed Martin Corporation, and successfully launching and recovering EM-1 after its test flight.[2] Further, Program officials are working toward an optimistic internal launch date of August 2021 for EM-2 – a date 20 months earlier than the Agency's external commitment date of April 2023. We noted our concern that such an approach, particularly given the Orion Program's

[1] In February 2017, the Acting Administrator announced that NASA was assessing the feasibility of flying crew on EM-1.

[2] NASA OIG, "NASA's Management of the Orion Multi-Purpose Crew Vehicle Program" (IG-16-029, September 6, 2016).

flat budget profile, has led the Program to defer addressing several technical tasks to later in the development cycle, which in turn could delay the Program's schedule, increase costs, and negatively affect safety.

In a March 2015 audit, we reported the GSDO Program – which is responsible for modifying launch infrastructure at the Kennedy Space Center (Kennedy) to accommodate the SLS and Orion – had made steady progress on the major equipment and facilities modernization initiatives needed for launch. However, we also reported the Agency continued to face significant technical and programmatic challenges originating primarily from interdependencies between the SLS, Orion, and GSDO programs to meet a November 2018 EM-1 launch date.[3] In a March 2016 audit, we examined the GSDO Program's software development effort, known as the Spaceport Command and Control System.[4] We reported the development effort had significantly exceeded its initial cost and schedule estimates and that several planned capabilities had been deferred because of cost and timing pressures. Although NASA officials believe the Spaceport Command and Control System will operate safely without these capabilities, they acknowledge the reduced capability could affect the ability to react to unexpected issues during launch operations and potentially impact the launch schedule for the integrated SLS/Orion systems.

Management of Human Health and Performance Risks

Humans living in space experience a range of physiological changes that can affect their ability to perform necessary mission functions and, in the long term, lead to cancers, damaged vision, reduced bone strength, and other harm to health and wellbeing. The Agency's plans to send humans deeper into space for extended periods of time will expose astronauts to new and increased physical and psychological hazards.

In an October 2015 report, we found that although NASA continues to improve its process for identifying and managing health and human performance risks associated with space flight, given the current state of knowledge, the Agency's schedule for mitigating risks is optimistic and it will not develop countermeasures for many deep space risks until the 2030s at the earliest.[5] One of the major factors limiting more timely development of countermeasures is uncertainty about the mass, volume, and weight requirements of deep space vehicles and habitats. Furthermore, NASA's management of crew health risks could benefit from increased efforts to integrate expertise from all relevant disciplines. While many life science specialists attempt to utilize a range of available expertise both inside and outside the Agency, NASA lacks a clear path for maximizing expertise and data at both the organizational and Agency levels.

MANAGING THE INTERNATIONAL SPACE STATION AND THE COMMERCIAL CARGO AND CREW PROGRAMS

In November 2015, NASA formally extended the life of the International Space Station (ISS or Station) through 2024, ensuring this unique facility, which has operated in low Earth orbit for more than 15 years, continues to support research into the development of new exploration technologies and ways to mitigate the dangers posed by deep space travel. A critical component of sustaining the ISS is ensuring safe and reliable transportation of cargo and crew to and from the ISS. With the retirement of the Space Shuttle in 2011, NASA has invested in privately owned and operated U.S. transportation systems to carry its cargo and crew to the Station.

[3] NASA OIG, "NASA's Launch Support and Infrastructure Modernization: Assessment of the Ground Systems Needed to Launch SLS and Orion" (IG-15-012, March 18, 2015).

[4] NASA OIG, "Audit of the Spaceport Command and Control System" (IG-16-015, March 28, 2016).

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

The International Space Station

International Space Station

With its plan to continue ISS operations into the next decade, NASA must ensure a spacecraft originally designed and tested for a 15-year life span will continue to operate as safely and economically as possible. The United States has invested more than $84 billion in the ISS over the last 23 years.[6] In fiscal year (FY) 2016, NASA's cost to operate the Station was almost $3 billion, with the Agency projecting these costs to increase to $3.8 billion by 2021. As we reported in 2014, we believe this estimate is based on overly optimistic assumptions and actual costs are likely to be higher.[7]

Moreover, as the Agency works toward sending astronauts deeper into space for extended periods of time, NASA must continue to be strategic in utilizing the Station's limited research capabilities. Since late 2011, the Center for the Advancement of Science in Space (CASIS) has managed non-NASA research aboard the ISS National Laboratory under a cooperative agreement with the Agency. Pursuant to this agreement, NASA provides CASIS $15 million annually and expects the organization to raise additional funds from private entities as part of its efforts to encourage companies to self-fund research on the Station.[8]

Commercial Cargo Transportation

Between 2006 and 2008, NASA entered into a series of funded Space Act Agreements with Orbital Sciences Corporation (Orbital), Space Exploration Technologies Corporation (SpaceX), and other private companies to stimulate development of space flight systems capable of transporting cargo to the ISS. In 2008, while development efforts were still underway, NASA awarded resupply contracts to Orbital and SpaceX. NASA subsequently extended Orbital's contract into 2018 for a total of 11 missions and SpaceX's contract into 2018 for a total of 20 missions. As of July 2016, Orbital had received $2.2 billion and SpaceX $1.9 billion from NASA.

Unfortunately, Orbital and SpaceX experienced launch failures on NASA missions in October 2014 and June 2015, respectively, destroying thousands of pounds of science and research, crew supplies, and vehicle hardware. In the aftermath of the failures, both companies suspended their cargo resupply missions until completion of separate investigations and acceptance by NASA of each company's Return to Flight Plan.

In a September 2015 report, we found Orbital's Return to Flight Plan contained technical and operational risks and may be difficult to execute as designed and on the timetable proposed.[9] Specifically, the company's plan to drop one of its five remaining previously scheduled resupply flights and carry the promised cargo in four missions may have disadvantaged NASA by decreasing the Agency's flexibility in choosing the type and size of cargo Orbital transports to the ISS.

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[6] This figure includes $30.7 billion for 37 supporting Space Shuttle flights.

[7] NASA OIG, "Extending the Operational Life of the International Space Station until 2024" (IG-14-031, September 18, 2014).

[8] Since release of our 2016 Top Management Challenges report, we initiated an audit of CASIS, which is described on page 27 of this report.

[9] NASA OIG, "NASA's Response to Orbital's October 2014 Launch Failure: Impacts on Commercial Resupply of the International Space Station" (IG-15-023, September 17, 2015).

In a June 2016 report, we issued a similar examination of the SpaceX cargo failure, finding that while NASA was effectively managing its commercial resupply contract with the company to reduce cost and financial risk, for the first seven cargo missions with SpaceX, the Agency did not fully utilize all available space for unpressurized cargo.[10] Further, for commercial cargo launches, the ISS Program adopted a risk management approach that provided insufficient information to NASA management concerning actual launch risks. In addition, NASA did not have an official, coordinated, and consistent mishap investigation policy for commercial resupply launches, which could affect its ability to determine the root cause of a launch failure and implement corrective actions.

In January 2016, NASA awarded a second round of contracts worth up to $14 billion to Orbital, SpaceX, and the Sierra Nevada Corporation to transport cargo to the ISS through 2024. NASA is expected to order a minimum of six missions from each provider at fixed prices with specified cargo amounts and performance dates based on the Station's needs.

Commercial Crew Transportation

Since the Space Shuttle Program ended in July 2011, the United States has lacked a domestic capability to transport crew to the ISS, instead relying on the Russian Federal Space Agency (Roscosmos) to ferry astronauts at prices ranging from $21 million to $82 million per roundtrip. Prior to the end of the Space Shuttle Program, NASA began working with several U.S. companies to develop the capability to provide safe, reliable, and cost-effective crew transportation to and from the ISS and low Earth orbit. The goal of the Commercial Crew Program is to foster an industry that would meet the Agency's transportation needs as well as those of other government and nongovernmental entities.

The fourth and final phase of NASA's Commercial Crew Program began in September 2014 with the award of contracts to The Boeing Company and SpaceX to complete development and certification of crewed space flight systems. In a September 2016 report, we found the Commercial Crew Program continued to face multiple challenges that would likely delay the first flight carrying NASA astronauts to the ISS until late 2018.[11] While past funding shortfalls have contributed to the delay, technical challenges with the contractors' spacecraft designs were now driving schedule slippages. Further, we found significant delays in NASA's evaluation and approval of hazard reports and related requests for variances submitted by The Boeing Company and SpaceX, which increased the risk that costly redesign work may be required late in development, further delaying safety certification. We also found NASA did not monitor the overall timeliness of its safety review process. Given delays in the Commercial Crew Program, NASA has extended its contract with Roscosmos for astronaut transportation through 2018 at an additional cost of $490 million. If the Program experiences additional delays, NASA may need to buy additional seats from Russia to ensure a continued U.S. presence on the ISS.[12]

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[10] NASA OIG, "NASA's Response to SpaceX's June 2015 Launch Failure: Impacts on Commercial Resupply of the International Space Station" (IG-16-025, June 28, 2016).

[11] NASA OIG, "NASA's Commercial Crew Program: Update on Development and Certification Efforts" (IG-16-028, September 1, 2016).

[12] In February 2017, NASA signed a $373.5 million agreement with The Boeing Company to purchase up to five seats that the company obtained as part of a settlement of a lawsuit with Russia.

MANAGING NASA'S SCIENCE PORTFOLIO

With an annual budget of approximately $5 billion that supports more than 100 projects and programs, managing the Science Mission Directorate's extensive portfolio poses significant challenges to NASA. Throughout its history, the Agency has struggled with accurately estimating the amount of time and money required to complete its science projects and programs. The resulting cost and schedule overruns have led to challenges in the project development process, diverted funding from other projects, and reduced the number and scope of projects the Agency can undertake. Three programs that have experienced these issues are the James Webb Space Telescope (JWST); the Ice, Cloud, and Land Elevation Satellite-2 (ICESat-2); and the Stratospheric Observatory for Infrared Astronomy (SOFIA) Program.

JWST, the largest of the Science Mission Directorate's projects, has faced significant challenges in meeting cost, schedule, and performance goals throughout its development life-cycle. Program cost estimates in the late 1990s and early 2000s ranged from $1 billion to $3.5 billion, with an expected launch date between 2007 and 2011. JWST's revised baseline life-cycle cost estimate is $8.84 billion, and its expected launch date is October 2018.

A satellite mission designed to provide the data necessary to determine ice sheet mass balance and track changes in features including glaciers and sea ice, ICESat-2 will allow scientists to see where ice is flowing, melting, or growing and to investigate the global impacts – such as sea level rise – of these changes. Originally, ICESat-2 had a life-cycle cost of $860 million and a launch date of May 2017; however, managers underestimated the technical complexity of building the satellite's sole instrument. Since rebaselining life-cycle costs at $1.1 billion in 2014, NASA has made significant progress and is now anticipating a launch in late 2017.

SOFIA is an airborne observatory designed to study the universe in the infrared region of the electromagnetic spectrum. Over the course of its 20-year lifespan, the Program has experienced numerous schedule delays and cost overruns. NASA proposed to greatly reduce funding for SOFIA in its FY 2015 budget request, intending to divert its $80 million annual operating budget to support other science missions. Within a year, however, Congress restored funding for SOFIA, necessitating a replan of NASA's science portfolio.

To improve the fidelity of its cost and schedule estimates for projects such as JWST, ICESat-2, and SOFIA, NASA has developed several tools, including formal adoption of a Joint Cost and Schedule Confidence Level (JCL) requirement that generates a representation of the likelihood a project will achieve its objectives within budget and on time. In a September 2015 audit, we found that while it appears the JCL policy is having a positive impact on NASA's historical challenges with cost and schedule fidelity, the process is relatively new, still evolving, and not a one-stop solution to solving all root causes of cost overruns and schedule delays.[13] In addition, we found varied expectations and understandings among Agency stakeholders about the JCL process, and the effectiveness and consistency of the process NASA uses to review a project's JCL analysis could be improved.

NASA also works collaboratively with foreign space agencies on many of its science projects, and in 2016 the Agency was managing more than 750 international agreements with 125 different countries, approximately half related to science. In a May 2016 audit, we reported NASA faces significant challenges when using international partnerships and discussed the potential impacts when partners do not meet expectations.[14] Such challenges included the process of developing

[13] NASA OIG, "Audit of NASA's Joint Cost and Schedule Confidence Level Process" (IG-15-024, September 29, 2015).

[14] NASA OIG, "NASA's International Partnerships: Capabilities, Benefits, and Challenges" (IG-16-020, May 5, 2016).

Stratospheric Observatory for Infrared Astronomy

agreements with foreign space agencies taking many months if not years to obtain; U.S. export control regulations hindering dialogue between NASA and its partners; and the lack of strong, centralized international space coordination groups making dialogue between NASA and its partners more difficult. We also found that the U.S. political process and geopolitical realities complicate NASA's efforts to expand international partnerships, particularly with the Russian and Chinese space agencies.

OVERHAULING NASA'S INFORMATION TECHNOLOGY GOVERNANCE

For more than 2 decades, NASA has struggled to implement an effective information technology (IT) governance approach that appropriately aligns authority and responsibility commensurate with the Agency's overall mission. Because IT is intrinsic and pervasive throughout NASA – in 2016, the Agency spent approximately $1.4 billion of its $19.3 billion budget on IT – the Agency's IT governance structure directly affects its ability to attain its strategic goals. For this reason, effective IT governance must balance compliance, cost, risk, security, and mission success to meet the needs of internal and external stakeholders.

In a June 2013 audit, we found that the decentralized nature of NASA's operations and its longstanding culture of autonomy hinder the Agency's ability to implement effective IT governance.[15] For example, the Chief Information Officer had limited visibility and control over a majority of the Agency's IT investments, operated in an organizational structure that marginalizes the authority of the position, and could not enforce security measures across NASA's computer networks. Moreover, the Agency's IT governance structure was overly complex and did not function effectively, resulting in managers relying on informal relationships rather than formalized business processes when making IT-related decisions.

In March 2016, we opened a follow-up review to evaluate NASA's IT governance in light of the changes the Agency has made. As part of this review, we are examining aspects of NASA's implementation of the Federal Information Technology Acquisition Reform Act, which seeks to strengthen the role of Federal agency Chief Information Officers in overseeing IT investments, acquisitions, and programs.

SECURING NASA'S INFORMATION TECHNOLOGY SYSTEMS AND DATA

The large number of NASA networks and websites, coupled with the Agency's statutory mission to share scientific information, present unique IT security challenges. For FYs 2014 and 2015, NASA reported 3,044 computer security incidents resulting in the installation of malicious software on or unauthorized access to Agency computers. Moreover, NASA's extensive connectivity with educational institutions, research facilities, and other outside organizations offers cybercriminals a larger target than most other Government agencies, with the Agency managing approximately 1,200 publicly accessible web applications.

In April 2016, we reported that while NASA has made progress in support of an Agency-wide information security program, it lacks an Agency-wide risk management framework for information security and related architecture to access, respond to, and monitor risk over time.[16] In November 2015, we initiated a follow-up audit of NASA's use of cloud computing services to determine whether NASA has implemented Agency-wide plans, procedures, and controls to meet Federal and Agency IT security requirements to protect the confidentiality, integrity, and availability of NASA data maintained by cloud

[15] NASA OIG, "NASA's Information Technology Governance" (IG-13-015, June 5, 2013).

[16] NASA OIG, "Review of NASA's Information Security Program" (IG-16-016, April 14, 2016).

service providers.[17] In another ongoing audit, we are reviewing whether NASA has implemented effective physical and logical security controls to protect industrial control systems, which are involved in the operation of launch facilities and other critical and supporting infrastructure assets, against physical and cybersecurity threats.[18]

In addition, OIG investigators have conducted more than 90 investigations of breaches of NASA IT networks over the past 5 years and helped to secure convictions of hackers operating all over the world, including in Australia, England, Italy, Nigeria, Portugal, Romania, and Turkey. For example, an OIG investigation led to the identification, arrest, and extradition of a Nigerian national for charges related to aggravated identity and credit card theft. In another case, six Estonian nationals were convicted for their roles in a cybercriminal scheme that infected dozens of NASA computers and millions of computer systems worldwide.

ADDRESSING NASA'S AGING INFRASTRUCTURE AND FACILITIES

NASA controls approximately 5,000 buildings and structures with an estimated replacement value of about $34 billion, making the Agency one of the largest Federal Government property holders. More than 80 percent of the Agency's facilities are 40 or more years old and beyond their design life. NASA strives to keep these facilities in an operational status, and when not operational, in sufficient condition not to pose a safety hazard. However, NASA has not been able to fully fund required maintenance for its facilities, and in 2016 the Agency estimated its deferred maintenance costs at $2.4 billion.

The OIG has dedicated substantial resources over the last 6 years to examining NASA's infrastructure challenges. For example, in a February 2013 audit we assessed NASA's efforts to reduce unneeded infrastructure and facilities, and recommended NASA complete a facilities review process begun the year before and ensure such a process was established in policy.[19] We also recommended NASA develop a mechanism for communicating its decisions regarding disposition of facilities to outside stakeholders and implement changes to a NASA database integral to facility management.

Launch Pad 39B at Kennedy Space Center

In 2012, the Technical Capabilities Assessment Team (TCAT) was created to provide NASA leadership with information needed to make decisions about investing and divesting to ensure the Agency has the right mix of people and assets to carry out its mission. As an outgrowth of the TCAT process, in 2015 NASA established 32 Capability Leadership teams of senior engineering, science, aircraft, and mission operations leaders to continuously assess their disciplines from an Agency-wide perspective to meet long-term needs, optimize deployment of capabilities across Centers, and transition capabilities no longer needed. As of August 2016, TCAT and Capability Leadership teams had assessed 32 technical capabilities and issued 36 formal decisions, which resulted in the Agency

[17] NASA OIG "NASA's Progress in Adopting Cloud-Computing Technologies" (IG-13-021, July 29, 2013).

[18] Since release of our 2016 Top Management Challenges report, we issued reports examining cloud computing services and industrial control systems, summaries of which can be found in the Information Technology Security and Governance section of this report.

[19] NASA OIG, "NASA's Efforts to Reduce Unneeded Infrastructure and Facilities" (IG-13-008, February 12, 2013).

excessing aircraft and vacuum chambers, eliminating internal microgravity flight operations, deactivating a propulsion test stand, updating internal memorandums of agreement, and consolidating research and development activities. We are reviewing the TCAT and Capability Leadership teams' work to assess whether the process will result in meaningful, long-term actions.[20]

Given the disparity between the Agency's infrastructure and its mission-related needs, as well as the likelihood of ongoing funding concerns, it is imperative NASA move forward aggressively with its infrastructure assessment and reduction efforts. To achieve this goal, the Agency will need to move away from its longstanding "keep it in case you need it" mindset and overcome historical incentives for the Centers to build up and maintain unneeded capabilities. In addition, NASA officials need to manage the concerns of political leaders about the impacts eliminating or consolidating facilities will have on Centers' missions, their workforces, and the local communities.

ENSURING THE INTEGRITY OF THE CONTRACTING AND GRANTS PROCESSES

NASA spent approximately 77 percent of its $18 billion FY 2015 budget on contracts to procure goods and services, and the Agency awarded an additional $905 million in grants and cooperative agreements.[21] Accordingly, NASA managers face the ongoing challenge of ensuring the Agency receives fair value for its money and that recipients spend NASA funds appropriately to accomplish stated goals. For its part, the OIG seeks to assist NASA in these efforts by examining Agency-wide procurement and grant-making processes; auditing individual contracts, grants, and cooperative agreements; and investigating potential misuse of Agency contract and grant funds.

During the past year, the OIG continued to uncover fraud and misconduct related to NASA contracts. For example, a research professor who made false statements to Government officials to obtain 22 grants and contracts from NASA and other agencies valued at $6.4 million pled guilty to wire fraud and was sentenced to 3 years of probation, paid a $175,000 fine, forfeited $180,000, and was debarred from Government contracting for 3 years. Several subcontractors were also convicted of conspiracy to pay kickbacks to a procurement official employed by a contractor that supplies satellites and satellite parts to NASA and other Government agencies. The subcontractors received prison sentences of up to 3 years and forfeited more than $700,000 in ill-gotten gains.

We also continue to focus audit resources on NASA's multibillion dollar contracting and procurement activities. In FY 2015, NASA spent $5.8 billion on service contracts pursuant to which contractors supplied time, effort, and expertise to perform specified tasks. For example, Kennedy has a $1.9 billion Engineering Services Contract with Vencore Solutions, Inc. to provide services ranging from laboratory and shop maintenance to space flight engineering. In a May 2016 audit, we found several tasks Vencore is performing on a cost-reimbursable basis appear more suitable for a fixed-price arrangement, cost and tasks included in its baseline and task order components are not clearly defined, managers overseeing the contract lack appropriate expertise, cost allocations are not clear, and NASA's ability to evaluate Vencore's performance is limited.[22] As a result, NASA's evaluations of Vencore's performance did not

[20] Since release of our 2016 Top Management Challenges Report, we issued a report on the TCAT and Capability Leadership teams, a summary of which can be found on page 35 of this report.

[21] As of March 2017, NASA has spent approximately 80 percent of its $18.5 billion FY 2016 budget on contracts to procure goods and services, and the Agency awarded an additional $974 million in grants and cooperative agreements.

[22] NASA OIG, "Audit of NASA's Engineering Services Contract at Kennedy Space Center" (IG-16-017, May 5, 2016).

consistently support the award-fee scores assigned or the resulting payments, and we questioned more than $450,000 in award-fee payments NASA made to Vencore between FYs 2011 and 2014.

NASA also faces the ongoing challenge of ensuring grant and cooperative agreement funds are administered appropriately and that recipients are accomplishing stated goals. We conducted several audits during the past year that examined NASA's management of grants and cooperative agreements, including a review of a $3.36 million National Space Grant College and Fellowship Program grant to the University of Texas at Austin, the lead institution for the Texas Space Grant Consortium.[23] While we found the University had a strong system of accounting and internal controls and that the Consortium satisfied the overall performance goals and objectives of the grant, we identified deficiencies in the Consortium's management of award funds and NASA's oversight of the grant's cost matching.

Over the past 5 years, we conducted 25 grant fraud investigations resulting in 5 convictions, $638,783 in recoveries, $2.9 million in civil settlements, 2 suspensions, and 3 debarments. For example, a joint investigation by the NASA OIG, the National Science Foundation OIG, and the U.S. Secret Service revealed the owner of a small business spent nearly $800,000 in Federal grant funds on personal expenses, including mortgage payments, private school tuition for his children, vacations, shopping, and wire transfers to family and friends overseas.

ENSURING THE CONTINUED EFFICACY OF THE SPACE COMMUNICATIONS NETWORK

To meet the need of spacecraft to communicate with Earth and provide communications, navigation, and transmission of scientific data to space flight missions, NASA operates the Space Communications and Navigation (SCaN) Program. SCaN is composed of three networks: (1) the Near Earth Network, which covers low Earth orbit and portions of geosynchronous and lunar orbit; (2) the Space Network, which controls the Tracking and Data Relay Satellites through a network of geographically diverse ground systems; and (3) the Deep Space Network, which covers NASA communications beyond low Earth orbit, including planetary exploration missions to Mars and beyond. The SCaN Program also manages NASA's use of the electromagnetic spectrum, which encompasses various types of electromagnetic radiation including radio waves.

Without SCaN services, NASA could not receive data transmissions from its satellites and robotic missions or control such missions from Earth, and space hardware worth tens of billions of dollars would be little more than orbiting debris. We issued three reports examining each of the networks and opened a fourth audit examining NASA's management of its electromagnetic spectrum allocation.[24]

Our first SCaN audit, issued in April 2014, focused on the Space Network.[25] At the time, NASA was upgrading the Space Network through the Space Network Ground Segment Sustainment Project with the goal of implementing a modern ground system that would deliver high-quality services while reducing operations and maintenance costs. We found key components of the Space Network were not meeting planned cost, schedule, and

[23] NASA OIG, "Audit of NASA Space Grant Awarded to the University of Texas at Austin" (IG-16-013, February 18, 2016).

[24] Since release of our 2016 Top Management Challenges Report, we issued a report on NASA's management of its electromagnetic spectrum allotment, a summary of which can be found on page 25 of this report.

[25] NASA OIG, "Space Communications and Navigation: NASA's Management of the Space Network" (IG 14-018, April 29, 2014).

performance goals, and that the delays and cost growth increased the risk the Space Network would be unable to continue to provide adequate communication services to NASA missions and its customers.

Our second SCaN audit, issued in March 2015, focused on the Deep Space Network.[26] Although the Network was meeting its operational commitments, budget reductions had challenged its ability to maintain current performance levels and threatened its future reliability by delaying upgrades, closing antennas, and canceling or replanning tasks. We also found significant deviation from Federal and Agency policies and procedures for ensuring the security of the Deep Space Network's IT and physical infrastructure.

Our third SCaN audit, issued in March 2016, focused on the Near Earth Network.[27] To meet increasing demand for communication services, the Near Earth Network uses non-U.S. Government entities to transmit Agency data, resulting in significant security challenges. Similar to the Deep Space Network, we found NASA deviated from elements of Federal and Agency cyber and physical security risk management policies. Additionally, Near Earth Network IT security controls were not in place or functioning as intended. At the same time, the Near Earth Network's assets are aging and located in extreme environments, requiring maintenance and modernization to ensure continued services for existing and planned missions.

2016 Report on NASA's Top Management and Performance Challenges (November 15, 2016)

https://oig.nasa.gov/NASA2016ManagementChallenges.pdf (report)

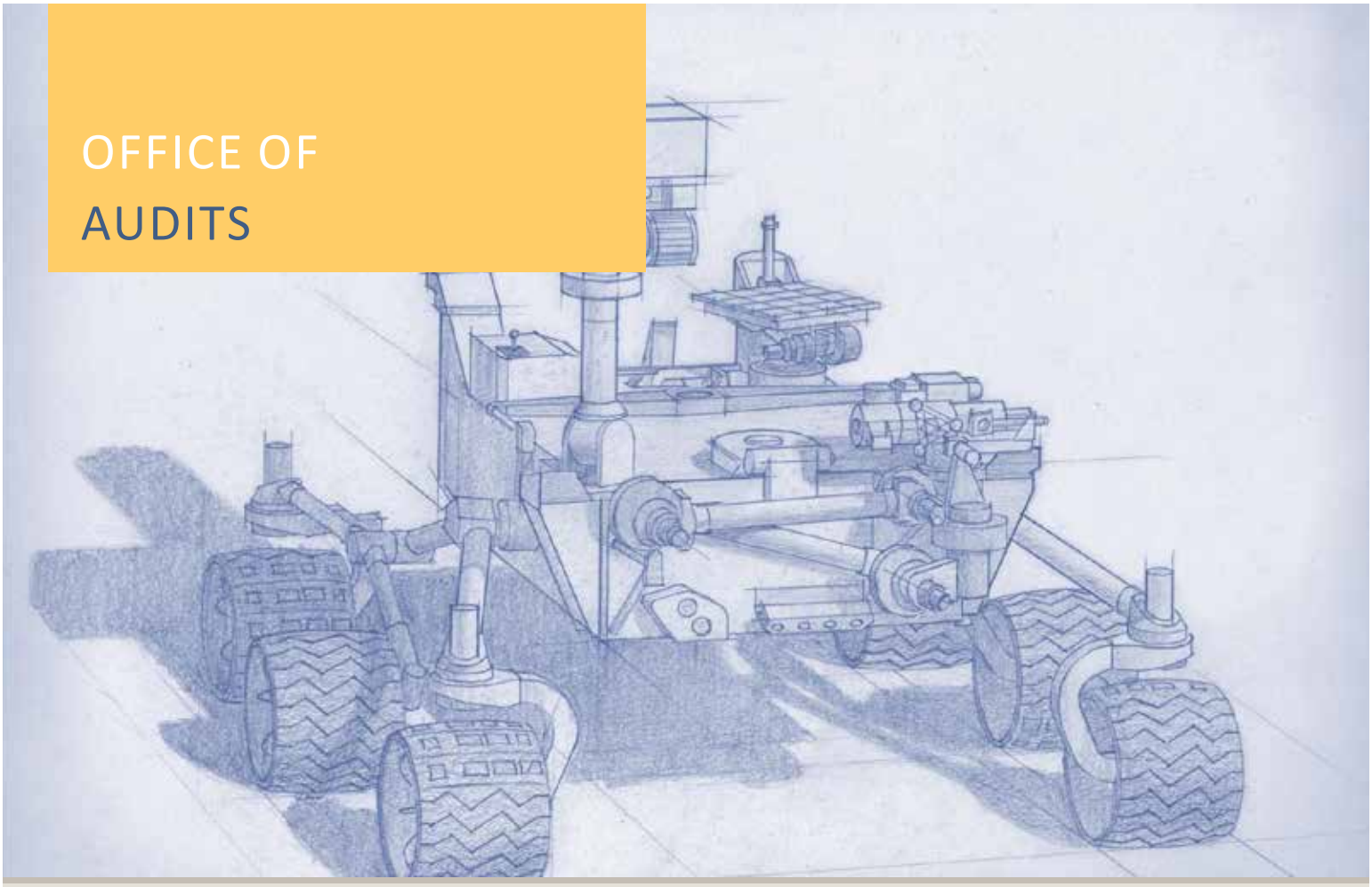
https://oig.nasa.gov/Video/RWeiland_11302016.html (video)

[26] NASA OIG, "NASA's Management of the Deep Space Network" (IG-15-013, March 26, 2015).

[27] NASA OIG, "NASA's Management of the Near Earth Network" (IG-16-014, March 17, 2016).

The Goldstone Deep Space Communications Complex, located in the Mojave Desert in California

OFFICE OF AUDITS



Blueprint-style rendering of the Mars 2020 Rover

ACQUISITION AND PROJECT MANAGEMENT

Effective contract, grant, and project management remains a top challenge for NASA. Through its audits, the OIG helps ensure NASA engages in sound procurement and acquisition practices that provide the Agency and taxpayer with the best possible value.

NASA'S MARS 2020 PROJECT

Since 1964, NASA has spent more than $21 billion on missions exploring Mars, including four robotic rovers on the Martian surface, five static landers, and numerous satellite missions orbiting the planet. Each mission has contributed to the scientific understanding of Mars and built on discoveries made by prior missions. For example, NASA's most recent rover mission to the planet – the Mars Science Laboratory (MSL), which landed in August 2012 – confirmed that key ingredients needed to support living microbes, such as carbon, nitrogen, oxygen, phosphorus, and sulfur, were present on ancient Mars.

NASA's next robotic rover mission to the Red Planet – known as Mars 2020 – will be equipped with seven science instruments to further scientific understanding of Mars and demonstrate new technologies, including an experiment to produce oxygen from carbon dioxide in the Martian atmosphere that will support the Agency's goal of sending humans to the planet in the 2030s. While the $2.4 billion Mars 2020 Project will utilize new and modified technology, particularly with respect to its on-board instruments, the Project will also use a significant amount of heritage technology from MSL in an effort to reduce mission costs and risks. The rover will have the capability to travel about 12 miles from the landing site, and the plan is to spend at least 1.25 Mars years (28 Earth months) exploring the surrounding region.

We assessed NASA's management of the Mars 2020 Project relative to achieving technical objectives, meeting milestones, and controlling costs, including examining how emerging challenges could affect the mission and whether the project plan is based on complete, reliable, and accurate cost, schedule, and risk information.

The primary constraint and driver for Mars 2020 development is the Project's planned July 2020 launch date. An optimal 20-day launch window for a trip from Earth to Mars occurs every 26 months. Missing the 2020 launch window would result in significant additional costs related to overhead, stand-by workforce, replacement of degraded parts and components, and storage while waiting for the next launch opportunity. Although Mars 2020 Project management has taken appropriate steps to address risks inherent in using heritage technology and several issues identified on the MSL mission, we identified several schedule-related issues that could indicate the Project is overly optimistic, including a condensed development schedule for five of the seven instruments, a shorter development timeframe than MSL, and a less detailed Integrated Master Schedule for assigning timelines to all required tasks than MSL.

The largest risk to the Mars 2020 schedule is the Project's Sample and Caching Subsystem (Sampling System), which will collect core samples of Martian rocks and soil and place them on the planet's

surface for retrieval by a future robotic or human mission. At Preliminary Design Review, three of the Sampling System's critical technologies were below technology readiness level 6, meaning the prototype had not yet demonstrated the capability to perform all the functions required. Projects are evaluated during Preliminary Design Review to ensure they meet all system requirements with acceptable risk and within cost and schedule constraints. The immaturity of the critical technologies related to the Sampling System is concerning because, according to Mars 2020 Project managers, the Sampling System is the rover's most complex new development component with delays likely to eat into the Project's schedule reserve and, in the worst-case scenario, could delay launch. As of December 2016, the Project was tracking the risk that the Sampling System may not be ready for integration and testing – the period when a spacecraft is built, undergoes final testing, and is prepared for launch – in May 2019, as planned.

The Mars 2020 Project also does not appear to be on track to meet the 90 percent metric for release of engineering drawings by the February 2017 Critical Design Review (when a project demonstrates its design is sufficiently mature to proceed to full-scale fabrication, assembly, integration, and testing). Engineering drawings communicate to manufacturers the details of a product's design and are considered a good measure of a project's stability. Failure to achieve this metric could affect the Project's ability to ensure design stability, achieve technical objectives, and meet schedule and cost expectations.

In addition to the risks associated with the Sampling System and the engineering drawings, we identified several other challenges confronting Mars 2020 Project managers, including late delivery of actuators (the components responsible for moving and controlling parts and instruments on the rover); foregoing an engineering model of the Mars Oxygen In-Situ Resource Utilization Experiment (MOXIE) designed to assess the feasibility of producing oxygen on Mars as a cost-savings measure; ensuring the rover does not exceed its designed mass limit of 1,050 kilograms; and addressing foreign partner funding issues that may affect their ability to timely deliver components to the Project.

To assist the Mars 2020 rover mission in achieving its technical objectives, meeting Project milestones, and controlling costs, we recommended the Associate Administrator for Science require the Mars 2020 Project Manager to (1) ensure the technology readiness levels of critical technologies and the rate of releasable engineering drawings meet established criteria before the Project completes Critical Design Review; (2) develop alternative plans to minimize changes to the overall science mission, Project cost, schedule, and scope if current risks to the actuators, mass growth, MOXIE, and Sampling System are realized; (3) assess the effectiveness of using a less detailed Integrated Master Schedule and make timely adjustments if required; and (4) continue to work with partners facing funding issues. NASA concurred with our recommendations.

NASA's Mars 2020 Project (IG-17-009, January 30, 2017)

https://oig.nasa.gov/audits/reports/FY17/IG-17-009.pdf (report);

https://oig.nasa.gov/Video/RTolemeo_01232017.html (video)

NASA'S EARTH SCIENCE MISSION PORTFOLIO

For more than 50 years, NASA has launched satellites and other scientific instruments into space to observe the Earth and collect information on climate, weather, and natural phenomena such as earthquakes, droughts, floods, and wildfires. This Earth observation data provides individual citizens, commercial entities, and government and military organizations information to prepare for

and react to weather phenomena and natural disasters, manage agricultural and other natural resources, and operate transportation systems.

NASA's Earth science missions are heavily influenced by external stakeholders including the President, Congress, other Federal agencies, and the National Research Council, which in 2007 issued a Decadal Survey identifying Earth science priorities and recommending NASA pursue 15 specific missions. In response, NASA's Earth Science Division published NASA's Plan for a Climate-Centric Architecture for Earth Observations and Applications from Space (Architecture Plan), which attempted to incorporate both the recommendations of the Decadal Survey and Presidential and congressional priorities, and described 20 Earth science missions the Agency planned to undertake.

In this audit, we assessed NASA's management of its Earth science portfolio to determine whether the Agency is effectively meeting stakeholder needs, how it is addressing challenges to implementing its Earth science priorities, and the ways in which stakeholders use the Earth observation data NASA collects. In addition, we reviewed the status of the 69 satellite and instrument missions in NASA's Earth science portfolio as of September 2016.

We found that NASA's Earth science portfolio adequately reflects stakeholder input, the Earth Science Division's approach to developing the Architecture Plan was reasonable, and the Plan includes missions that address all six of the Agency's Earth science focus areas. However, due primarily to budget issues and the availability and affordability of launch vehicles, NASA has not carried out the Architecture Plan as intended and is increasingly reliant on an aging Earth observation infrastructure to monitor the planet. Specifically, although the Architecture Plan envisioned launching 17 missions by 2020, including 11 by the end of 2016, as of September 2016 the Agency had launched only 7 missions, and it is unlikely the others will launch on the schedule outlined in the Plan. Consequently, as missions are delayed, the Architecture Plan has become increasingly outdated and includes missions that may become a lower priority for the science community. While the delays have not prevented NASA from substantially meeting stakeholder needs for Earth observation data, more than half of the Agency's 16 operating missions have surpassed their designed lifespan and are increasingly prone to failures that could result in critical data loss and gaps in long-term observation records.

Over the past several decades, NASA has faced constraints affecting the management and balance of its Earth science portfolio, including (1) unrealistic cost estimates, (2) cost growth, (3) budgetary constraints, (4) changing priorities and direction from the President and Congress, (5) launch vehicle issues, and (6) mission and instrument failures. While the Earth Science Division has taken steps to address these constraints by forming partnerships with other Government entities and foreign space agencies, improving the methodology for National Research Council Decadal Surveys (including the second Earth Science Decadal Survey expected in 2017), and extending current missions, these issues are likely to continue to affect the Agency's Earth science portfolio.

The number of products delivered to users by NASA during the past 15 years has risen dramatically from about 8.14 million in 2000 to 1.42 billion in 2015. Government agencies, scientists, private entities, and other stakeholders rely on NASA to process raw information received from Earth observation systems into usable data. Moreover, NASA's Earth observation data is routinely used by government agencies, policymakers, and researchers to expand understanding of the Earth system and to enhance economic competitiveness, protect life and property, and develop policies to help protect the planet. Finally, NASA is working to address suggestions that it use commercially provided data to augment its Earth observation data. However, NASA must reconcile its policy that promotes open

sharing of data at minimal cost to users with a commercial business model under which fees may create a barrier to use.

To improve NASA's management of its Earth science portfolio, we recommended the Agency update the Architecture Plan every 5 years to align with the release of Earth Science Decadal Surveys and mid-term Surveys to account for portfolio changes and develop strategies to engage with commercial companies to investigate cost-beneficial acquisition, disposition, and use of Earth observing data. The Agency concurred with our recommendations.

NASA's Earth Science Mission Portfolio (IG-17-003, November 2, 2016)

https://oig.nasa.gov/audits/reports/FY17/IG-17-003.pdf (report);

https://oig.nasa.gov/Video/LHawkins_10252016.html (video)

NASA'S PARTS QUALITY CONTROL PROCESS

To achieve its mission of advancing science, technology, aeronautics, and space exploration, NASA builds and operates launch vehicles, propulsion systems, robots, satellites, telescopes, and other complex science instruments. Generally, these devices operate in space, where temperature and radiation are significantly harsher than on Earth and malfunctions cannot be easily repaired. Accordingly, the parts the Agency and its contractors procure and use to build these instruments and hardware have high performance and quality requirements and are essential to NASA's mission success.

Although mission failures are relatively infrequent, in the past 10 years, NASA has incurred financial losses of approximately $1.3 billion when parts that did not meet performance expectations or quality standards caused missions and instruments to fail. In addition to the financial impact, these failures deprived NASA and other users of valuable scientific data. In the face of pressure to take advantage of state-of-the-art technology, faster delivery, and lower costs, NASA's move toward acquiring more commercially produced "off the shelf" products introduces increased risk and additional unknowns into the Agency's parts quality control processes.

In this audit, we evaluated the Agency's parts and supplier quality control processes, parts and supplier data collection and sharing practices, and processes for overseeing contractor quality management systems.

Although NASA has a number of initiatives in place to help ensure the selection of quality parts from reliable suppliers, we found Centers generally manage their parts quality and supplier assessment data unilaterally rather than collaborating through a comprehensive, integrated, Agency-wide parts and supplier information system. Specifically, the Agency does not maintain a centralized parts quality history database or facilitate the integration of individual Center systems, track all relevant supplier performance history, or enforce requirements that Centers participate in Agency parts quality management systems. Without these control mechanisms, it is more difficult for NASA to mitigate the risk of nonconforming parts entering its project hardware supply chain. As NASA continues to rely more heavily on commercial parts rather than parts that are custom-built or built to military specifications, it is even more important that comprehensive control mechanisms are in place. Moreover, the lack of a coordinated approach may lead to higher costs and schedule delays if faulty parts are acquired and additional testing, qualification, and procurement of replacement parts becomes necessary.

In addition, NASA policy requires project managers to consider risk factors when preparing Program/Project Quality Assurance Surveillance Plans for critical and complex acquisitions. These Plans document contractor operations that need Government oversight and the activities, metrics, control mechanisms, and organizations that will

conduct quality assurance functions for the project. We found the policy does not provide sufficient surveillance and audit planning guidance for project personnel to analyze and select contractor surveillance activities commensurate with the level of risk of nonconforming parts being incorporated into a product. Consequently, the Plans we reviewed incorporated and applied risk assessments inconsistently, and resource allocations for those projects may not have been commensurate with the projects' risk acceptance goals for parts quality. Inefficient surveillance activities could overburden resources or increase the risk of integrating a part of inappropriate quality into a project.

To increase transparency, accountability, and oversight of NASA's parts quality management processes, we made eight recommendations to the Chief of Safety and Mission Assurance, including that he expand current NASA data sharing to integrate supplier databases with parts databases, evaluate current parts and supplier database system architectures to determine the cost and benefits of establishing an Agency-wide database system, investigate causes of gaps in reporting and formulate remedial actions to ensure compliance with reporting requirements, and review a sample of Program/Project Quality Assurance Surveillance Plans to identify deficiencies and best practices. The Agency concurred with our recommendations.

NASA's Parts Quality Control Process (IG-17-016, March 29, 2017)

https://oig.nasa.gov/audits/reports/FY17/IG-17-016.pdf (report);

https://oig.nasa.gov/Video/BMullin_04072017.html (video)

EARTH VENTURE SUBORBITAL INVESTIGATIONS

Climate, weather, and other natural phenomena such as earthquakes, droughts, floods, and wildfires affect the health and wellbeing of everyone on Earth. Moreover, industries vulnerable to these events, including agriculture, insurance, real estate, and manufacturing, account for up to 40 percent of the U.S. economy, or about $7.2 trillion in 2015. As we reported in a November 2016 report, NASA's space-based Earth science observations play an important role in planning for and mitigating the deleterious impacts of these extreme weather and other natural phenomena.[28]

In response to the National Research Council's 2007 Decadal Survey, in 2009 the NASA Science Mission Directorate created the Earth Venture Class Project to conduct low cost Earth science research and application missions. Administered by the Earth Science Division's Earth System Science Pathfinder Program, the Earth Venture Class Project regularly solicits and competitively selects Earth science investigations with cost caps varying between $30 and $150 million. The Project consists of three activities: (1) small missions, (2) instruments, and (3) suborbital investigations.

We evaluated NASA's Earth Venture Suborbital (EVS) investigations to assess whether they were meeting science objectives, adhering to established cost caps, and using the most appropriate platform to perform their research.

Capped at $30 million, NASA competitively selects EVS investigations through solicitations that occur every 4 years, and each investigation must be completed within 5 years. Along with these cost and life-cycle constraints, EVS investigations must advance Earth system science objectives and use mature system technology. In February 2009 and February 2013, the Science Mission Directorate solicited proposals for EVS-1 and EVS-2 investigations, respectively. Five investigations were selected for EVS-1 and six for EVS-2. All EVS-1

[28] NASA OIG, "NASA's Earth Science Mission Portfolio" (IG-17-003, November 2, 2016).

investigations had been completed at the time of our fieldwork, while EVS-2 investigations, which began in FY 2015, had completed their first year of effort.

We found all five EVS-1 investigations completed their proposed missions within the set cost caps. Each investigation provided the raw data and analysis from each flight campaign to a database accessible to the public, issued numerous publications, provided outreach activities, and documented lessons learned.

Based on its experience with the EVS-1 investigations, NASA made changes to improve its EVS-2 administration, including adjusting Agency program and project management criteria, requiring that investigations provide project implementation plans, using grants rather than contracts for non-NASA led investigations, and directing investigations to issue publications throughout the project to enable the public more timely access to data. We found that post-selection aircraft changes appeared to be reasonable and that management applied lessons learned from EVS-1 to the EVS-2 process. Because the EVS-2 investigations are in the early stages, we could not determine whether they will achieve their science objectives or keep to the $30 million threshold.

We made no specific recommendations to NASA in this memorandum.

Artist's rendering of the Global Precipitation Measurement Core Observatory, a joint project between NASA and the Japanese Aerospace Exploration Agency

Earth Venture Suborbital Investigations (IG-17-013, March 13, 2017)

https://oig.nasa.gov/audits/reports/FY17/IG-17-013.pdf

ONGOING AUDIT WORK

Audit of NASA's Management of its Spare Parts Inventory

NASA purchases spare parts for flight programs and projects from a variety of contractors. For example, NASA has more than $200 million worth of spare parts from MSL, some of which will be used for the Mars 2020 rover mission. We are evaluating NASA's procedures related to procurement, usage, storage, and disposal of spare parts used in development of the Agency's science and space projects.

Audit of the Surface Water and Ocean Topography Mission

Scheduled to launch in April 2021, this $755 million mission, with an additional $400 million contribution from foreign partners, is designed to provide the first global survey of Earth's surface water to enable better prediction of weather and climate. In this audit, we are evaluating NASA's management of the mission relative to achieving technical objectives, meeting milestones, and controlling costs.

Earth's oceans as viewed from space

Audit of NASA's Management of the Safe Autonomous Systems Operations Project and Unmanned Aircraft Systems

Congress has mandated that NASA, through the Agency's Safe Autonomous Systems Operations Project and in collaboration with the Federal Aviation Administration, address the needs of future air transportation and airspace operations by ensuring safe integration of unmanned aircraft systems (commonly known as drones) into the national airspace. In this audit, we are evaluating NASA's efforts to meet this goal.

Audit of the National Space Biomedical Research Institute

The study of human physiological response to space travel and exploration is fundamental to NASA's current and future human space flight endeavors. To perform these scientific studies, NASA engaged in a cooperative agreement with the National Space Biomedical Research Institute. The Institute's original cooperative agreement with NASA began in March 1997, and NASA exercised the final option period to extend the agreement through September 2017, bringing the total value of the agreement to $484.2 million. This audit is evaluating NASA's management of the cooperative agreement relative to achieving objectives, meeting milestones, and controlling costs.

CubeSats being launched from the International Space Station

SPACE OPERATIONS AND HUMAN EXPLORATION

Space operations and human exploration are among NASA's most highly visible missions, with the Agency operating the ISS, managing the commercial cargo and crew programs that support the ISS, and planning for future exploration beyond low Earth orbit with the SLS and Orion crew capsule.

NASA'S MANAGEMENT OF ELECTROMAGNETIC SPECTRUM

NASA relies on radio waves and other portions of the electromagnetic spectrum to communicate with the spacecraft that carry out the Agency's space and science missions and to conduct day-to-day operations. However, the radio portion of the electromagnetic spectrum (radio spectrum) is a finite resource, and a rapidly growing number of communications devices has increased the demand for usable radio spectrum. To avoid interference, multiple users generally cannot transmit radio signals at the same frequencies, at the same time, to the same location. Accordingly, several domestic and international organizations manage radio spectrum among various users, including Federal agencies and commercial entities.

In light of this growing demand, and because the radio spectrum and other portions of the electromagnetic spectrum are vital to NASA's missions, we initiated this audit to review the Agency's efforts to manage its electromagnetic spectrum allocation.

Overall, NASA is effectively managing challenges to its radio spectrum access. NASA missions operate in a constantly evolving electromagnetic spectrum environment, and the Agency faces several challenges in ensuring its current and future missions have adequate access to the radio spectrum. NASA must comply with Federal initiatives designed to make additional radio spectrum available to the mobile broadband industry and share radio spectrum historically reserved for Federal users with the emerging commercial space launch industry. In addition, the proliferation of small satellites (SmallSat) for educational or technology development projects is straining already congested radio spectrum resources. Finally, future NASA missions are expected to require higher data transmission rates, which could overwhelm the frequency band allocations NASA currently uses.

NASA has addressed these challenges by collaborating with other Federal agencies and commercial industry users and regulators worldwide, pursuing new technologies, and issuing guidance to Agency radio spectrum users. However, NASA's space flight program management policies do not include key electromagnetic spectrum requirements. As a result, this increases the risk project developers, particularly SmallSat developers who may be unfamiliar with NASA processes, will not incorporate electromagnetic spectrum requirements into their development plans in a timely manner. This in turn increases the risk a project will have to make costly design changes or miss a planned launch date. Indeed, NASA's experience with the SLS – which is relying on waivers to meet the radio spectrum needs for its

first two launches – illustrates the need for timely consideration of electromagnetic spectrum requirements.

To ensure NASA programs and projects are aware of electromagnetic spectrum requirements and submit a request for radio spectrum certification early in the development cycle, we recommended the Agency clarify its program management policies. The Agency concurred with our recommendations.

NASA's Management of Electromagnetic Spectrum (IG-17-012, March 9, 2017)

https://oig.nasa.gov/audits/reports/FY17/IG-17-012.pdf (report)

https://oig.nasa.gov/Video/RBowman_03062017.html (video)

Combining almost opposite ends of the electromagnetic spectrum, this image of the Eagle Nebula uses far-infrared and X-ray observations from the European Space Agency's Herschel Space Observatory and X-ray Multi-Mirror Mission, respectively

ONGOING AUDIT WORK

NASA's Plans for Human Exploration Beyond Low Earth Orbit

In 2015, NASA published its framework for the Journey to Mars describing the Agency's strategy for conducting human exploration of space, which includes crewed missions to Mars. In support of this effort, the Agency completed critical design reviews for three major exploration systems – SLS, Orion, and GSDO. We are reviewing NASA's plans for human exploration beyond low Earth orbit, the systems being developed to support these efforts, and the potential costs.

NASA's Management and Development of Spacesuits

Since the first extravehicular activities or spacewalks in 1965, the capabilities of astronauts to work outside their spacecraft have steadily progressed. The Extravehicular Mobility Unit, or "spacesuit," NASA astronauts currently use was originally developed in the early 1980s for use during the Space Shuttle Program. New spacesuits are planned for future human exploration missions, such as NASA's Journey to Mars. We are examining NASA's management of the current spacesuits and development of next-generation suits for cislunar and deep space applications.

Spacesuit testing at NASA's Neutral Buoyancy Laboratory

Audit of NASA's Oversight of the Center for Advancement of Science in Space Cooperative Agreement

The NASA Authorization Act of 2010 required the NASA Administrator to provide initial financial assistance and enter into a cooperative agreement with a nonprofit to manage the activities of the ISS National Laboratory for non-NASA research. The resultant cooperative agreement provides CASIS $15 million annually through 2020 for these activities. In this audit, we are assessing whether CASIS has met NASA's expectations in managing the National Laboratory and produced useful and measurable results.

Astronaut conducting research onboard the International Space Station National Laboratory

Long exposure photo taken from the International Space Station showing star and Earth trails

INFORMATION TECHNOLOGY SECURITY AND GOVERNANCE

Information technology plays an integral role in every facet of NASA's space, science, and aeronautics operations. In FY 2015, the Agency spent more than $1.4 billion on a portfolio of IT assets that includes hundreds of information systems used to control spacecraft, collect and process scientific data, provide security for its IT infrastructure, and enable NASA personnel to collaborate with colleagues around the world. Through audits and investigations, the OIG has identified systemic and recurring weaknesses in NASA's IT security program that adversely affect the Agency's ability to protect the information and information systems vital to its mission. Achieving the Agency's IT security goals will require sustained improvements in NASA's overarching IT governance and management practices.

INDUSTRIAL CONTROL SYSTEM SECURITY WITHIN NASA'S CRITICAL AND SUPPORTING INFRASTRUCTURE

In keeping with the evolution of technology, NASA has increasingly moved away from isolated, manually controlled operational technology (OT) systems to an environment in which physical processes are controlled with sophisticated and interconnected IT equipment. As more devices become "smart" through wireless connectivity, OT systems that once required hands-on manipulation such as adjusting a valve or flipping a switch can now be controlled remotely. Many of these OT systems are part of the Agency's critical infrastructure used to test rocket propulsion systems, control and communicate with spacecraft, and operate ground support facilities, or are associated with the electrical power, heating and cooling systems, and other supporting infrastructure. While the convergence of IT and OT can lead to cost savings and other efficiencies, it also means OT systems are potentially vulnerable to the types of security challenges more common to IT systems, including malicious hacking.

In this review, we examined whether NASA has implemented effective policies, procedures, and controls to protect the systems it uses to operate its critical infrastructure.

Despite its significant presence across the Agency and its criticality to the success of the Agency's multi-faceted mission, NASA has not adequately defined OT, developed a centralized inventory of OT systems, or established a standard protocol to protect systems that contain OT components. NASA needs to know which systems incorporate OT components because applying traditional IT security practices to OT systems can cause the underlying systems to malfunction. For example, a security patch caused monitoring equipment in a large engineering oven to stop running, resulting in a fire that destroyed spacecraft hardware inside the oven. The computer reboot caused by the software upgrade also impeded alarm activation, leaving the fire undetected for 3.5 hours. Further, limited awareness of OT systems across the Agency has led to systems lacking the application of comprehensive security best practices. Moreover, NASA's current policies do not distinguish OT from

IT, and the Agency does not offer training focused on protecting OT systems. As a result, NASA is not well positioned to meet the security demands of an evolving OT environment and is assuming unnecessary risk for critical Agency systems and facilities with OT components.

NASA also lacks an integrated approach to managing risk associated with its critical infrastructure that incorporates physical security and cybersecurity considerations in all phases of risk assessment and remediation. Specifically, the security of physical and cyber components of NASA's critical assets is managed with minimal collaboration among key Agency stakeholders and does not involve the Office of Strategic Infrastructure, which manages the supporting infrastructure associated with critical assets. This disjointed approach has led to duplication of effort and gaps in security planning and risk remediation at both the Agency and Center levels. Further, based on the inconsistent security practices we observed at various Centers, we question the overall efficacy of NASA's process for identifying critical infrastructure. Finally, inadequate guidance and oversight, coupled with insufficient funding and record keeping, limit the visibility and insight into NASA's critical infrastructure protection processes and ultimately impair the Agency's ability to protect its vital assets.

To ensure the Agency is adequately assessing risk for, applying security controls to, and identifying its critical assets, we made six recommendations: (1) develop a framework to coordinate security efforts across the Agency, (2) develop a standardized process to assess Agency cyber and physical assets for NASA critical infrastructure, (3) ensure appropriate Agency personnel are included in functional reviews of NASA's critical infrastructure assets and facility security assessments, (4) coordinate the development of a methodology for the identification and protection of interdependencies, (5) develop security policy and procedures for managing the protection of OT that addresses key areas identified during this review, and (6) establish an integrated cyber and physical risk management committee or oversight body to ensure NASA is adequately identifying critical infrastructure and supporting interdependencies and appropriately protecting its OT systems. NASA management concurred or partially concurred with our recommendations.

Industrial Control System Security within NASA's Critical and Supporting Infrastructure (IG-17-011, February 8, 2017)

https://oig.nasa.gov/audits/reports/FY17/IG-17-011.pdf (report);

https://oig.nasa.gov/Video/LNicolosi_02082017.html (video)

SECURITY OF NASA'S CLOUD COMPUTING SERVICES

NASA's IT portfolio includes systems that control spacecraft, collect and process scientific data, provide security for critical infrastructure, and enable Agency personnel to collaborate with colleagues around the world. In FY 2016, the Agency spent approximately $1.4 billion on IT investments in support of its mission. Among these investments was the acquisition of cloud computing services from commercial companies.

To accelerate the Federal Government's use of cloud computing, the Office of Management and Budget in 2011 required agencies to adopt a "Cloud First" policy when contemplating IT purchases and to evaluate secure, reliable, and cost-effective cloud computing alternatives when making new IT investments. To help Federal agencies meet these requirements, the General Services Administration collaborated with the National Institute of Standards and Technology and the Departments of Defense and Homeland Security to establish the Federal Risk and Authorization Management Program (FedRAMP). Since June 2014, Federal agencies have been required to ensure their cloud services are FedRAMP-approved.

In July 2013, we reported that weaknesses in NASA's IT risk management and governance practices had impeded the Agency from fully realizing the benefits of cloud computing and potentially put NASA systems and data stored in the cloud at risk.[29] The objective of this audit was to reassess NASA's cloud computing efforts and examine whether the Agency has effectively implemented plans, procedures, and controls to meet Federal and Agency IT security requirements for protecting the confidentiality, integrity, and availability of data stored in the cloud.

While NASA has made improvements since our 2013 audit, continuing weaknesses in its governance and risk management processes have prevented the Agency from fully realizing the benefits of cloud computing and continue to leave Agency information stored in cloud environments at unnecessary risk. The Office of the Chief Information Officer made available to Agency staff three FedRAMP-compliant cloud computing services and approved 19 others for use. It has also moved just over 1 percent of eligible Agency data into approved cloud services. In addition, in an effort to capture the universe of services in use at the Agency, the Office of the Chief Information Officer created a cloud services registry.

However, NASA has not completed the necessary steps to ensure all approved services are registered with FedRAMP. Further, several of the services on the registry lacked authorizations to operate and were not covered by an IT system security plan. We also discovered an additional 20 cloud services in use at NASA not on the registry. Although 14 of these services had been approved and authorized by Center IT security officials, 6 lacked authorizations to operate or system security plans and had not been tested for appropriate security controls. We also identified numerous instances in which Agency personnel acquired cloud services using contracts that lacked provisions intended to address key business and IT security risks associated with cloud environments. As NASA continues to move more data to the cloud, it is imperative the Agency strengthen its risk management and governance practices to safeguard its information.

To strengthen security controls over cloud computing, we made the following six recommendations to the NASA Chief Information Officer: (1) monitor adherence to the requirement that only approved cloud computing services be used and block access on NASA networks for unapproved services; (2) ensure acquisition of any cloud computing services are properly coordinated and accounted for on the Agency's cloud services registry and that all recommended contract provisions are incorporated into the acquisition; (3) ensure NASA's portfolio of approved cloud computing services is sufficient to meet Agency needs; (4) ensure all approved cloud services are registered with FedRAMP and are FedRAMP compliant; (5) ensure information on the use of and risks associated with cloud computing is incorporated into NASA IT security training; and (6) direct all NASA Centers, Mission Directorates, and Program and Project Offices to review current cloud computing services and take necessary steps to ensure existing services meet FedRAMP requirements. NASA management concurred or partially concurred with our recommendations.

Security of NASA's Cloud Computing Services (IG-17-010, February 7, 2017)

https://oig.nasa.gov/audits/reports/FY17/IG-17-010.pdf (report);

https://oig.nasa.gov/Video/BMullins_02072017.html (video)

[29] NASA OIG, "NASA's Progress in Adopting Cloud-Computing Technologies" (IG-13-021, July 29, 2013).

FEDERAL INFORMATION SECURITY MODERNIZATION ACT: FISCAL YEAR 2016 EVALUATION

This annual report, submitted as a memorandum from the Inspector General to the NASA Administrator, provides the OIG's independent assessment of the Agency's IT security posture as required by the Federal Information Security Modernization Act of 2014 (FISMA). For our FY 2016 review, we used a risk-based approach to examine a sample of five Agency and contractor information systems. We also considered findings from our previous work in reaching our conclusions.

For FY 2016, FISMA reporting requirements are aligned with the National Institute of Standards and Technology Framework for Improving Critical Infrastructure Cybersecurity (Cybersecurity Framework). The Cybersecurity Framework includes activities, desired outcomes, and applicable references common across critical infrastructure sectors and focuses on five specific functions critical to an effective information security program:

1. **Identify.** Develop the organizational understanding to manage cybersecurity risk to systems, assets, data, and capabilities.
2. **Protect.** Develop and implement the appropriate safeguards to ensure delivery of critical infrastructure services.
3. **Detect.** Develop and implement the appropriate activities to identify the occurrence of a cybersecurity event.
4. **Respond.** Develop and implement the appropriate activities to take action regarding a detected cybersecurity event.
5. **Recover.** Develop and implement the appropriate activities to maintain plans for resilience and to restore capabilities or services impaired due to a cybersecurity event.

Together, these functions provide a strategic view of the life-cycle of an organization's cybersecurity risk management program.

In addition, the Office of Management and Budget and the Department of Homeland Security developed a scoring system with point allocations for each of the functions. Agencies are allotted up to 20 points for each function for a total of 100 points, which would represent a fully effective information security system. Agencies accumulate points by satisfying metrics associated with attainment of the five functions and, accordingly, the more mature an agency's efforts on a particular function, the higher its score for that function.

Overall, we determined that NASA lacks an effective program in any of the five functions, earning 27 of the possible 100 maturity level points. NASA earned 3 points each for the Protect and Detect functions, indicating it lacks formalized programs in those areas and performs activities in a reactive rather than proactive manner. For the other three functions NASA scored 7 points each, indicating it has formalized programs in those areas but fails to consistently implement them Agency-wide. That said, we noted NASA has several efforts underway in each of the functional areas to improve its information security program.

By implementing previous OIG audit recommendations and taking additional actions, NASA is working to improve its overall information security posture. Nevertheless, as indicated by the results of this review, information security remains a top management challenge for the Agency. Moving forward, we will continue to examine NASA's information security program both through focused audits of discrete issues and future FISMA reviews.

Federal Information Security Modernization Act: Fiscal Year 2016 Evaluation (IG-17-002, November 7, 2016)

https://oig.nasa.gov/audits/reports/FY17/IG-17-002A.pdf

ONGOING AUDIT WORK

Audit of NASA's Efforts to Improve the Agency's Information Technology Governance

For more than two decades, NASA has struggled to implement an effective approach to IT governance that appropriately aligns authority and responsibility consistent with the Agency's overall mission. In 2013, the OIG examined NASA's IT governance and made eight recommendations for improvement. This follow-on audit will assess the efforts NASA has made since the issuance of our 2013 report to improve the Agency's IT governance.

Audit of NASA's Information Technology Supply Chain Risk Management Efforts

NASA's IT operations rely on global supply chains to fulfill mission needs. Such reliance can pose a significant risk, as foreign developed or manufactured technology may be compromised in production. This audit will determine the effectiveness of NASA's security controls related to its IT Supply Chain Risk Management efforts. Specifically, we will determine whether NASA has established and implemented Agency-wide plans, procedures, and controls to meet Federal and Agency IT security requirements to protect the confidentiality, integrity, and availability of NASA data, computer systems, and networks.

Audit of NASA's Security Operations Center

NASA's Security Operations Center serves as the Agency's nerve center for detecting and monitoring security incidents and providing continuous event detection, situational awareness, and incident management and tracking. In this review, we will assess NASA's management of the Security Operations Center. Specifically, we will evaluate capability, workload, and resource management as well as continuity of operations in line with the Security Operations Center's mission and the Agency's cybersecurity posture.

Review of NASA's Information Security Program under the Federal Information Security Modernization Act for Fiscal Year 2017

In this required annual review, we are evaluating NASA's IT security program against the 2017 FISMA metrics. Specifically, we are reviewing a sample of NASA- and contractor-owned information systems to assess the effectiveness of information security policies, procedures, standards, and guidelines. Additionally, we are evaluating whether major deficiencies identified in our 2016 FISMA review have been addressed.

Supersonic Wind Tunnel at Glenn Research Center

INFRASTRUCTURE

NASA's real property includes more than 5,000 buildings and other structures, such as wind tunnels, laboratories, launch pads, and test stands, that occupy 44 million square feet and are valued at more than $34 billion. However, over 70 percent of NASA's facilities are more than 50 years old and reaching the end of their design life spans. Managing its expansive portfolio is an ongoing challenge for the Agency, and one we continue to monitor.

NASA'S EFFORTS TO "RIGHTSIZE" ITS WORKFORCE, FACILITIES, AND OTHER SUPPORTING ASSETS

To accomplish its diverse scientific and space exploration missions, NASA relies on specialized facilities and infrastructure, unique equipment and tools, and a highly skilled civil servant and contractor workforce. These assets, collectively known as technical capabilities, are spread across NASA's 10 Centers and include more than 5,000 buildings and other structures, 17,000 civil servants, and tens of thousands of contractors. Over the years, striking the right balance among these various assets has been a top management challenge, with the Agency making a number of mostly unsuccessful attempts at "rightsizing" its technical capabilities.

In June 2012, NASA established the Technical Capabilities Assessment Team (TCAT) to identify and assess Agency technical capabilities and make recommendations for investing in, consolidating, or eliminating capabilities based on mission requirements. To institutionalize capability management into its annual planning and budgeting processes, NASA replaced TCAT with the Capability Leadership Model (CLM) in 2015. CLM is designed to advance NASA's technical capabilities to meet long-term missions, optimize deployment of capabilities across its major facilities, and transition capabilities no longer needed.

In this audit, we assessed NASA's ongoing efforts to strategically manage its technical capabilities to ensure the Agency is prepared for current and future missions.

Through the TCAT and CLM processes, NASA has established a framework that should improve the Agency's ability to manage its technical capabilities and make the difficult decisions regarding infrastructure and personnel required to optimally position itself for current and future missions. However, after more than 4 years, the Agency has yet to make many concrete decisions about its technical capabilities – for example, to consolidate or dispose of assets. Rather, most decisions have been iterative steps on the path to making actual determinations about technical capabilities, leaving us concerned that the Agency's efforts have been slow to produce meaningful results.

Moreover, NASA's assessments of its capabilities did not consistently include information needed to make informed decisions, including mission needs or facility usage data, analyses to determine gaps or overlaps, or recommendations to achieve cost savings. In addition, NASA did not incorporate in its process the best practices we identified from other

successful rightsizing efforts, including following standardized guidance, incorporating independent analysis and cost benefit rationales, and setting firm timeframes for completing actions. Finally, NASA continues to face the long-standing challenges of its federated governance model, uncertainty about its direction and future missions, political influence, and the lack of institutionalized processes that have hindered past Agency efforts to strategically align its technical capabilities.

We believe NASA must continue to press forward with CLM and that Agency leaders should work to further institutionalize the process, continue their efforts to promote the process both inside and outside the Agency, and take steps to ensure best practices are incorporated in future assessments. Ultimately, Agency leaders must be willing to make difficult decisions to invest, divest, or consolidate unneeded infrastructure; effectively communicate those decisions to stakeholders; and withstand the inevitable pressures from Federal, state, and local officials. Failure to do so increases the risk the Agency will continue to spend valuable resources on unneeded technical capabilities and be unable to deliver the technical capabilities required for future missions.

To ensure NASA's efforts to evaluate technical capabilities are institutionalized and sustained over time, we recommended the Associate Administrator (1) create standardized guidance for performing annual capability assessments; (2) evaluate CLM assessments and teams to better ensure independence; (3) develop and institute training, communications, or other measures to ensure capability assessments are complete, thorough, and include expected goals and results; and (4) revise the CLM decision process to include implementation timeframes for dispositioning agreed upon actions. The Agency concurred with our recommendations.

NASA's Efforts to "Rightsize" its Workforce, Facilities, and Other Supporting Assets (IG-17-015, March 21, 2017)

https://oig.nasa.gov/audits/reports/FY17/IG-17-015.pdf (report)

https://oig.nasa.gov/Video/RBowman_03232017.html (video)

ONGOING AUDIT WORK

Audit of the Construction of Test Stands 4693 and 4697 at Marshall Space Flight Center

NASA's SLS will incorporate the largest cryogenic fuel tanks ever used on a rocket. Prior to launch, the tanks and related hardware must be tested to ensure they can withstand the stresses of launch. The two stands NASA will use for these tests were constructed at Marshall Space Flight Center in Huntsville, Alabama. The OIG is examining the test stand project to review cost, schedule, and performance goals, and whether the Agency appropriately considered options for acquisition, testing, and potential future use.

Test Stand 4697 at NASA's Marshall Space Flight Center

American flag floating in the Cupola module aboard the International Space Station

FINANCIAL MANAGEMENT

The OIG continues to both assess NASA's efforts to improve its financial management practices and make recommendations to assist the Agency in addressing weaknesses.

AUDIT OF NASA'S FISCAL YEAR 2016 FINANCIAL STATEMENTS

The OIG contracted with the independent public accounting firm CliftonLarsonAllen LLP (CLA) to audit NASA's FY 2016 financial statements. CLA performed the audit in accordance with the Government Accountability Office's *Government Auditing Standards* and the Office of Management and Budget's Bulletin No. 15-02, "Audit Requirements for Federal Financial Statements."

This audit resulted in an unmodified opinion on NASA's FY 2016 financial statements. An unmodified opinion means the financial statements present fairly, in all material respects, the financial position and results of NASA's operations in conformity with generally accepted accounting principles.

CLA also reported on NASA's internal control and compliance with laws and regulations. For FY 2016, CLA identified a significant deficiency for the second year in a row related to IT configuration management. CLA also reported a repeat noncompliance with the implementing guidance for the Single Audit Act, as amended. Additionally, CLA identified deficiencies of a lesser magnitude and reported them to the Chief Financial Officer (IG-17-007) and the Chief Information Officer (IG-17-006). CLA also reported specific information security weaknesses found during its vulnerability assessment and penetrating testing of NASA's financial systems (IG-17-001). Finally, CLA provided an unmodified opinion on NASA's closing package financial statements (IG-17-005).

Audit of NASA's Fiscal Year 2016 Financial Statements
(IG-17-004, November 15, 2016)

https://oig.nasa.gov/audits/reports/FY17/IG-17-004.pdf

ONGOING AUDIT WORK

Audit of NASA's Fiscal Year 2017 Financial Statements

The Chief Financial Officers Act of 1990, as amended by the Government Management Reform Act of 1994, requires an annual audit of NASA's consolidated financial statements. The OIG is overseeing the FY 2017 audit conducted by the independent public accounting firm CLA.

Audit of NASA's Compliance with the Improper Payments Information Act for Fiscal Year 2016

The Improper Payments Information Act of 2002, as amended by the Improper Payments Elimination and Recovery Act of 2010, seeks to enhance the accuracy and integrity of Federal payments. As mandated, the OIG is assessing NASA's compliance with the requirements of these Acts.

Audit of NASA's Compliance with the Digital Accountability and Transparency Act of 2014

The Digital Accountability and Transparency Act of 2014 seeks to expand the reporting requirements pursuant to the Federal Funding Accountability and Transparency Act of 2006. The Act requires Federal agencies to report financial and award data in accordance with the established Government-wide financial data standards. As mandated, we are assessing NASA's compliance with the Act.

OTHER AUDIT MATTERS

NASA'S COMPLIANCE WITH FEDERAL EXPORT CONTROL LAWS

In a January 2017 letter to Congress, the OIG summarized its work over the previous year relating to NASA's compliance with Federal export control laws. During the past year, we completed an audit examining NASA's implementation of recommendations made in reviews completed in 2013 and 2014 by the OIG, Government Accountability Office, and the National Academy of Public Administration designed to improve the Agency's export control and foreign national access management procedures. We also completed three audits examining NASA's controls over its IT assets and security systems, many of which contain data subject to export control laws, and initiated three additional audits related to IT security.

In addition, our Office of Investigations closed four investigations related to website intrusions and hacking by foreign nationals that could have exposed export-controlled information to loss or misuse.

NASA's Compliance with Federal Export Control Laws (IG-17-008, January 25, 2017)

https://oig.nasa.gov/audits/reports/FY17/IG-17-008.pdf

Astronauts conducting a spacewalk outside the International Space Station install new International Docking Adapter for commercial crew flights

STATISTICAL DATA

TABLE 1: AUDIT PRODUCTS ISSUED AND DISCLOSED TO THE PUBLIC, CURRENT SEMIANNUAL REPORT

Report No. and Date Issued	Title	Impact
Acquisition and Project Management		
IG-17-016, 03/29/2017	NASA's Parts Quality Control Process	Provided recommendations to improve transparency, accountability, and oversight of NASA's parts quality management processes
IG-17-013, 03/13/2017	Earth Venture Suborbital Investigations	Affirmed that Earth Venture Suborbital investigations were well managed, achieved their science requirements within the applicable $30 million threshold, and used the appropriate platform
IG-17-009, 01/30/2017	NASA's Mars 2020 Project	Provided recommendations to assist the Mars 2020 rover mission in achieving its technical objectives, meeting project milestones, and controlling costs
IG-17-003, 11/02/2016	NASA's Earth Science Mission Portfolio	Provided recommendations to improve NASA's management of its Earth science portfolio
Space Operations and Human Exploration		
IG-17-012, 03/09/2017	NASA's Management of Electromagnetic Spectrum	Identified challenges facing NASA's management of its electromagnetic spectrum allocation and actions for improvement
Information Technology Security and Governance		
IG-17-011, 02/08/2017	Industrial Control System Security within NASA's Critical and Supporting Infrastructure	Improvements in controls for securing industrial control systems within NASA's critical infrastructure through the enhancement of management collaboration, awareness, training, and processes
IG-17-010, 02/07/2017	Security of NASA's Cloud Computing Services	Recommended improvements to the effectiveness of NASA's information security controls relating to cloud computing services
IG-17-002, 11/07/2016	Federal Information Security Modernization Act: Fiscal Year 2016 Evaluation	Improvements in internal controls for IT security through the enhancement of management programs and processes
Infrastructure		
IG-17-015, 03/21/2017	NASA's Efforts to "Rightsize" its Workforce, Facilities, and Other Supporting Assets	Identified issues NASA must address to better rightsize its workforce, facilities, and other supporting assets

Report No. and Date Issued	Title	Impact
Financial Management		
IG-17-007, 12/14/2016	Fiscal Year 2016 Financial Accounting Management Letter	Improvements in the effectiveness of controls over financial reporting
IG-17-006, 12/01/2016	Fiscal Year 2016 Information Technology Management Letter	Improvements in the effectiveness of controls over the financial-related IT control environment
IG-17-005, 11/16/2016	Audit of NASAs Fiscal Year 2016 Closing Package Financial Statements	Improvements in NASA's ability to provide auditable closing package financial statements and sufficient evidence to support the financial statements throughout the fiscal year and at year end
IG-17-004, 11/15/2016	Audit of NASA's Fiscal Year 2016 Financial Statements	Improvements in NASA's ability to provide auditable financial statements and sufficient evidence to support the financial statements throughout the fiscal year and at year end
IG-17-001, 10/31/2016	Vulnerability Assessment and Penetration Testing of NASA's Financial Network	Improvements in the security of the Agency's financial systems
Other Audit Matters		
IG-17-008, 01/25/2017	NASA's Compliance with Federal Export Control Laws	Notified Congress of program weaknesses that may affect NASA's compliance with export control laws

TABLE 2: AUDIT PRODUCTS ISSUED AND NOT DISCLOSED TO THE PUBLIC, CURRENT SEMIANNUAL REPORT

Report No. and Date Issued	Title	Impact
ML-17-002, 12/09/2016	Desk Review of Fiscal Year 2015 Audit Report on the City of Hampton Issued by Cherry Bekaert LLP	Based on our review of the FY 2015 City of Hampton single audit reporting package, we determined that Cherry Bekaert's reports met generally accepted Government auditing standards and Office of Management and Budget Circular A-133 requirements but contained quality deficiencies that should be brought to the attention of the auditor for correction in future audits.

TABLE 3: AUDIT RECOMMENDATIONS YET TO BE IMPLEMENTED, CURRENT SEMIANNUAL REPORT

Report No. and Date Issued	Report Title	Date Resolved	Number of Recommendations		Latest Target Completion Date	Potential Cost Savings
			Open	Closed		
Acquisition and Project Management						
IG-17-016, 03/29/2017	NASA's Parts Quality Control Process	03/29/2017	8	0	12/31/2017	$0
IG-17-009, 01/30/2017	NASA's Mars 2020 Project	01/30/2017	4	0	03/30/2017	$0
IG-17-003, 11/02/2016	NASA's Earth Science Mission Portfolio	11/02/2016	2	0	06/30/2019	$0

Report No. and Date Issued	Report Title	Date Resolved	Number of Recommendations		Latest Target Completion Date	Potential Cost Savings
			Open	Closed		
Space Operations and Human Exploration						
IG-17-012, 03/09/2017	NASA's Management of Electromagnetic Spectrum	03/09/2017	2	0	11/20/2019	$0
Information Technology Security and Governance						
IG-17-011, 02/08/2017	Industrial Control System Security within NASA's Critical and Supporting Infrastructure	02/08/2017	5	1	10/01/2018	$0
IG-17-010, 02/07/2017	Security of NASA's Cloud Computing Services	–	6	0	01/31/2019	$0
Infrastructure						
IG-17-015, 03/21/2017	NASA's Efforts to "Rightsize" its Workforce, Facilities, and Other Supporting Efforts	03/21/2017	4	0	06/29/2018	$0
Financial Management						
IG-17-007, 12/14/2016	Fiscal Year 2016 Financial Accounting Management Letter	12/14/2016	46	0	12/31/2017	$0
IG-17-006, 12/01/2016	Fiscal Year 2016 Information Technology Management Letter	12/01/2016	25	0	12/31/2017	$0
IG-17-004, 11/15/2016	Audit of NASA's Fiscal Year 2016 Financial Statements	11/15/2016	13	0	11/30/2017	$0
IG-17-001, 10/31/2016	Vulnerability Assessment and Penetration Testing of NASA's Financial Network	10/31/2016	19	0	11/30/2017	$0

TABLE 4: AUDIT RECOMMENDATIONS YET TO BE IMPLEMENTED, PREVIOUS SEMIANNUAL REPORTS

Report No. and Date Issued	Title	Date Resolved	Number of Recommendations		Latest Target Completion Date	Potential Cost Savings
			Open	Closed		
Acquisition and Project Management						
IG-16-017, 05/05/2016	Audit of NASA's Engineering Services Contract at Kennedy Space Center	09/30/2016	3	1	03/29/2019	$0
IG-16-013, 02/18/2016	Audit of NASA Space Grant Awarded to the University of Texas at Austin	02/18/2016	2	2	09/30/2017	$322,500
IG-15-024, 09/29/2015	NASA's Joint Cost and Schedule Confidence Level Process	09/29/2015	4	4	06/30/2017	$0
IG-15-009, 12/16/2014	NASA's Use of Blanket Purchase Agreements	12/16/2014	4	4	01/31/2017	$0
IG-14-003, 11/19/2013	NASA's Use of Award-fee Contracts	04/03/2015	1	14	04/21/2017	$0
IG-12-018, 07/26/2012	Audit of NASA Grants Awarded to the Philadelphia College Opportunity Resources for Education	07/26/2012	3	5	10/31/2016	$0
Space Operations and Human Exploration						
IG-16-029, 09/06/2016	Audit of the Orion Multi-Purpose Crew Vehicle Program	09/06/2016	3	1	09/30/2017	$0
IG-16-028, 09/01/2016	NASA's Commercial Crew Program: Update on Development and Certification Efforts	12/19/2016	1	1	–	$0
IG-16-025, 06/28/2016	NASA's Response to SpaceX's June 2015 Launch Failure: Impacts on Commercial Resupply of the International Space Station	–	5	1	08/31/2017	$0
IG-16-015, 03/28/2016	Audit of Spaceport Control and Command System	03/28/2016	1	0	09/30/2018	$0
IG-16-014, 03/17/2016	NASA's Management of the Near Earth Network	08/10/2016	9	5	03/30/2018	$0
IG-16-008, 12/15/2015	NASA's Efforts to Manage Its Space Technology Portfolio	04/13/2016	3	2	03/31/2017	$0
IG-15-023, 09/17/2015	NASA's Response to Orbital's October 2014 Launch Failure: Impacts on Commercial Resupply of the International Space Station	12/02/2015	1	6	08/31/2017	$0
IG-15-013, 03/26/2015	NASA's Management of the Deep Space Network	03/26/2015	6	6	10/31/2017	$0

Report No. and Date Issued	Title	Date Resolved	Number of Recommendations		Latest Target Completion Date	Potential Cost Savings
			Open	Closed		
IG-14-031, 09/18/2014	Extending the Operational Life of the International Space Station Until 2024	09/29/2014	2	1	09/30/2017	$0
IG-14-026, 07/22/2014	Audit of the Space Network's Physical and Information Technology Security Risks	07/22/2014	2	2	01/17/2018	$0
Information Technology Security and Governance						
IG-16-016, 04/14/2016	Review of NASA's Information Security Program	04/14/2016	1	0	12/06/2019	$0
IG-14-023, 07/10/2014	Security of NASA's Publicly Accessible Web Applications	07/10/2014	2	3	09/28/2017	$0
IG-14-015, 02/27/2014	NASA's Management of its Smartphones, Tablets, and other Mobile Devices	02/27/2014	1	1	10/27/2017	$0
IG-12-017, 08/07/2012	Review of NASA's Computer Security Incident Detection and Handling Capability	08/07/2012	2	1	04/27/2017	$0
Institutional and Facility Management						
IG-15-019, 06/30/2015	Review of NASA's Pressure Vessel Systems	06/30/2015	2	8	06/30/2017	$0
IG-13-008, 02/12/2013	NASA's Efforts to Reduce Unneeded Infrastructure and Facilities	02/12/2013	2	3	02/01/2018	$0
Financial Management						
IG-16-021, 05/12/2016	NASA's Compliance with the Improper Payments Information Act for Fiscal Year 2015	10/28/2016	4	1	05/15/2018	$0
IG-15-015, 05/15/2015	NASA's Compliance with the Improper Payments Information Act for Fiscal Year 2014	05/15/2015	6	4	05/31/2017	$0
Other Audit Matters						
IG-16-030, 09/28/2016	Follow-up Evaluation of NASA's Implementation of Executive Order 13526, Classified National Security Information	09/28/2016	4	0	12/31/2017	$0
IG-16-022, 05/26/2016	Review of NASA's Implementation of Export Control and Foreign National Access Program Recommendations	09/19/2016	4	2	07/31/2017	$0
IG-16-001, 10/19/2015	NASA's Education Program	10/19/2015	1	3	06/29/2018	$0

TABLE 5: AUDITS WITH QUESTIONED COSTS

	Number of Audit Reports	Total Questioned Costs	Total Unsupported Costs
No management decision made by beginning of period	1	$462,612	$0
Issued during period	0	$0	$0
Needing management decision during period	1	$462,612	$0
Management decision made during period			
Amounts agreed to by management	0	$0	$0
Amounts not agreed to by management	1	$462,612	$0
No management decision at end of period			
Less than 6 months old	0	$0	$0
More than 6 months old	0	$0	$0

Notes: "Questioned Costs" (the Inspector General Act of 1978, as amended) are costs that is questioned by the OIG because of (1) alleged violation of a provision of a law, regulation, contract, grant, cooperative agreement, or other agreement or document governing the expenditure of funds; (2) a finding that, at the time of the audit, such cost is not supported by adequate documentation; or (3) a finding that the expenditure of funds for the intended purpose is unnecessary or unreasonable.

"Management Decision" (the Inspector General Act of 1978, as amended) is the evaluation by management of the findings and recommendations included in an audit report and the issuance of a final decision by management concerning its response to such findings and recommendations, including actions that management concludes are necessary.

TABLE 6: AUDITS WITH RECOMMENDATIONS THAT FUNDS BE PUT TO BETTER USE

	Number of Audit Reports	Funds To Be Put to Better Use
No management decision made by beginning of period	0	$0
Issued during period	0	$0
Needing management decision during period	0	$0
Management decision made during period		
Amounts agreed to by management	0	$0
Amounts not agreed to by management	0	$0
No management decision at end of period		
Less than 6 months old	0	$0
More than 6 months old	0	$0

TABLE 7: STATUS OF SINGLE AUDIT FINDINGS AND QUESTIONED COSTS RELATED TO NASA AWARDS

Audits with findings	12

Findings and Questioned Costs		
	Number of Findings	**Questioned Costs**
Management decisions pending, beginning of reporting period	29	$818,572
Findings added during the reporting period	24	$0
Management decisions made during reporting period	(31)	$0
Agreed to by management	0	$0
Not agreed to by management	0	($818,572)
Management decisions pending, end of reporting period	22	$0

Note: The Single Audit Act, as amended, requires Federal award recipients to obtain audits of their Federal awards. The data in this table is provided by NASA.

DEFENSE CONTRACT AUDIT AGENCY AUDITS OF NASA CONTRACTORS

The Defense Contract Audit Agency (DCAA) provides audit services to NASA on a reimbursable basis. DCAA provided the following information during this period on reports involving NASA contract activities.

DCAA AUDIT REPORTS ISSUED

During this period, DCAA issued 18 audit reports on contractors who do business with NASA. Corrective actions taken in response to DCAA audit report recommendations usually result from negotiations between the contractors doing business with NASA and the Government contracting officer with cognizant responsibility (e.g., the Defense Contract Management Agency and NASA). The cognizant agency responsible for administering the contract negotiates recoveries with the contractor after deciding whether to accept or reject the questioned costs and recommendations for funds to be put to better use. The following table shows the amounts of questioned costs and funds to be put to better use included in DCAA reports issued during this semiannual reporting period and the amounts that were agreed to during the reporting period.

TABLE 8: DCAA AUDIT REPORTS WITH QUESTIONED COSTS AND RECOMMENDATIONS THAT FUNDS BE PUT TO BETTER USE

	Amounts in Issued Reports	Amounts Agreed To
Questioned Costs	$4,520,000	$3,720,000
Funds To Be Put to Better Use	0	$0

Note: This data is provided to the NASA OIG by DCAA and may include forward pricing proposals, operations, incurred costs, cost accounting standards, and defective pricing audits. Because of limited time between availability of management information system data and legislative reporting requirements, there is minimal opportunity for DCAA to verify the accuracy of reported data. Accordingly, submitted data is subject to change based on subsequent DCAA authentication. The data presented does not include statistics on audits that resulted in contracts not awarded or in which the contractor was not successful.

OFFICE OF INVESTIGATIONS

Hubble Space Telescope image of Nebula N159, which is located 160,000 light-years away from Earth

PROCUREMENT, ACQUISITION, AND GRANT FRAUD

Congressman Sentenced

An investigation of fraud committed by Educational Advancement Alliance, Inc. and its president ended in the convictions and sentencing of the president, former Pennsylvania Congressman Chaka Fattah, and several associates. The organization received a series of Federal grants, including a $1.8 million grant from NASA to promote science, technology, engineering, and mathematics education. The investigation revealed that Educational Advancement Alliance, Inc. improperly used $100,000 of NASA grant money to pay a campaign debt on Congressman Fattah's behalf. In June 2016, a Federal jury convicted the Congressman and his associates of taking part in a racketeering conspiracy intended to further their political and financial interests by misappropriating Federal, charitable, and campaign funds. In December 2016, the Congressman was sentenced to 10 years of imprisonment. In addition, he received 3 years of supervised release and was ordered to pay $614,000 in restitution, of which $100,000 will be returned to NASA. The company president was sentenced to 2 years of imprisonment and 2 years of supervised release. The OIG assisted the Federal Bureau of Investigation and the Internal Revenue Service in the investigation.

Alabama Business Charged

As the result of an investigation conducted by the NASA OIG and the Defense Criminal Investigative Service, a Huntsville, Alabama, business was charged with making a false statement after it submitted the same research to NASA and the Department of Defense, billed both agencies for the same work, and falsely certified to NASA it had not received any Federal contracts for similar research.

NASA Contractor Indicted

A small business owner was charged with four counts of making false statements. A joint investigation by the NASA OIG, the Small Business Administration (SBA), and the Department of Labor OIG revealed that the owner failed to report her criminal history on a form used to determine SBA 8(a) Business Development Program eligibility. The business in question holds more than $6 million in NASA contracts awarded through the SBA 8(a) Program, which is designed to assist firms owned and controlled by socially and economically disadvantaged individuals.

Government Contractor Settles Allegations of Improper Contract Billing

As the result of an investigation conducted by the NASA OIG, the Defense Contract Management Agency, Defense Contract Audit Agency, and the Defense Criminal Investigative Service, a Nevada aerospace company agreed to pay $14.9 million to settle allegations it violated the Federal False Claims Act by knowingly misclassifying certain costs and causing various Government agencies to pay inflated overhead rates.

Small Business Owner Convicted

A small business owner pled guilty to one count of making a false statement in a Small Business Innovation Research (SBIR) contract report by listing ghost employees as research staff.

Company Agrees to Civil Settlement

A Chicago, Illinois, company agreed to pay $135,000 in a civil settlement to resolve allegations the company violated the False Claims Act by falsifying material costs under NASA SBIR contracts.

Government Contractor Sentenced for Fraud

In January 2017, a Los Angeles, California, contractor was sentenced to 2 years of imprisonment, 1 year of monitored home detention upon release, and ordered to pay a $7,500 fine stemming from charges of conspiracy and providing illegal gratuities. From 2008 through September 2012, the company co-owner, along with his business partner, conspired to provide gratuities to approximately 70 Government purchase cardholders in exchange for their continued business. The company owners paid approximately $42,590 in gratuities, which yielded an estimated $3 million in return business. The co-conspirator was sentenced to 3 years of probation.

Contractor Debarred

A small business and its owners have been excluded from receiving Federal contracts for 4 years following a fraud conviction. The owners accepted Federal research funding through a SBIR contract to support staff salaries, but assigned the project to unpaid university students and laboratory staff.

COMPUTER CRIMES

Hacker Indicted

Following a joint investigation by the NASA OIG and the Federal Bureau of Investigation, a U.S. citizen was indicted in January 2017 for conspiracy to commit unauthorized computer access. The subject was part of a hacking group that claimed to have taken control of a NASA drone. An investigation revealed the group never controlled the drone and only had access to publicly available data that they leveraged to perpetrate the hoax that they had hijacked a NASA drone.

Former Jet Propulsion Laboratory Employee Sentenced for Child Pornography

A former Jet Propulsion Laboratory employee was sentenced to 1 year of home confinement, 10 years of supervised release, and ordered to pay a $5,000 fine for possession of child pornography.

EMPLOYEE MISCONDUCT

Astronaut Resigns

An OIG investigation led to the resignation of an astronaut who admitted to fabricating travel receipts of more than $1,600 over a 3-year period. The Department of Justice declined prosecution in lieu of administrative action by NASA. The astronaut resigned, effective December 2016, before such action could be imposed.

Former NASA Employee Convicted

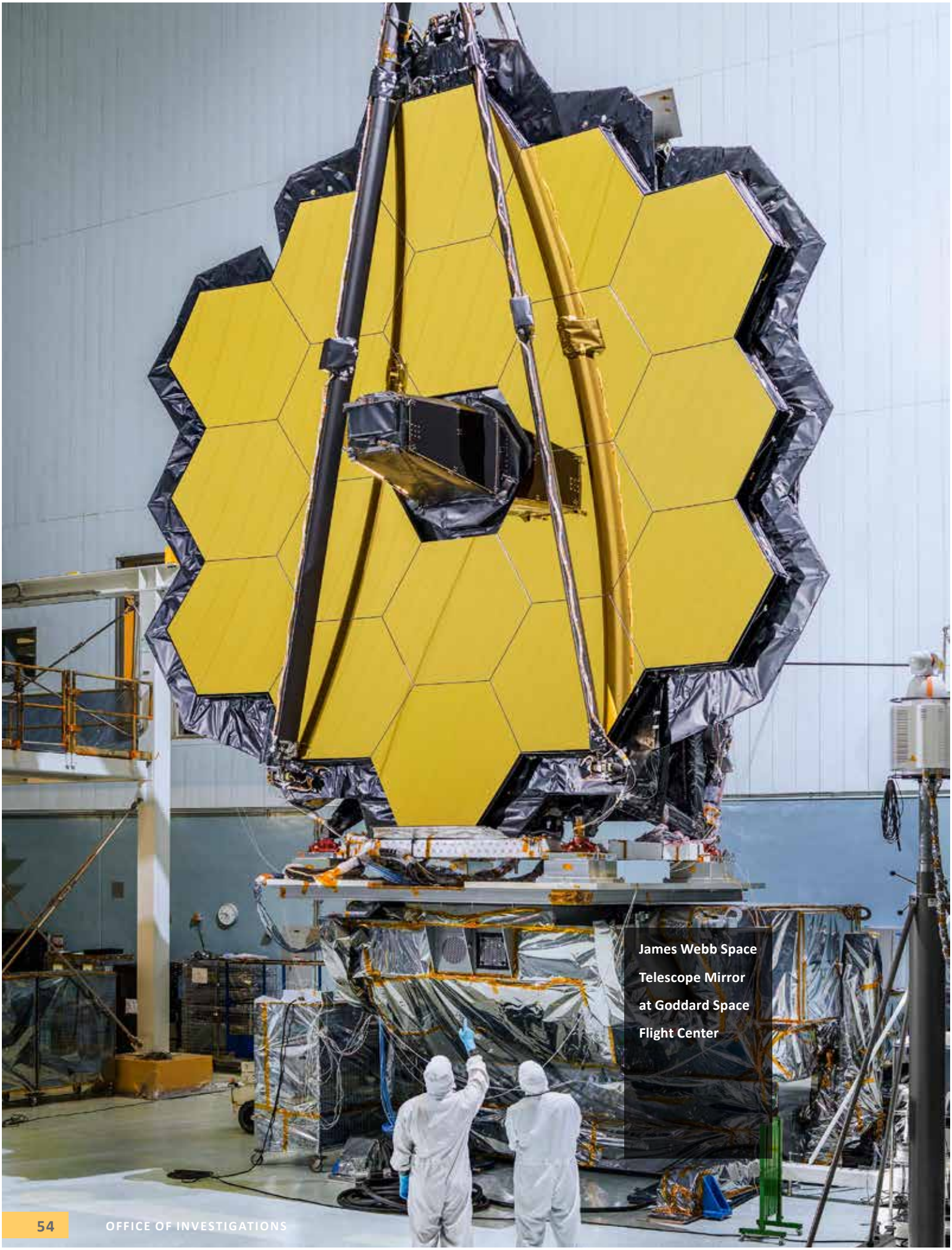
A former Goddard Space Flight Center civil servant was sentenced to 2 years of probation, directed to attend mental health counseling, and ordered to pay a $1,000 fine after pleading guilty to making numerous false statements to OIG investigators, including lying about his involvement in pressuring a contractor to award a task order to his friend's company.

NASA Employee Convicted of Trafficking in Counterfeit Goods

As the result of a joint investigation conducted by the NASA OIG, U.S. Immigration and Customs Enforcement (ICE), and ICE's Homeland Security Investigations (HSI), a Goddard Space Flight Center employee pled guilty to trafficking in counterfeit goods. Between November 2013 and March 2016, the subject used two personal eBay accounts to complete approximately 610 sales of counterfeit apparel and accessories. The subject engaged in these trafficking activities during work hours on his Government computer. To date, he remains employed at the Center.

NASA Employee Convicted and Sentenced

Through the combined investigative efforts of the NASA OIG, HSI, and the Tennessee Bureau of Investigations, a NASA employee pled guilty to one count of coercion and enticement of a minor to engage in sexual activity. The former employee was sentenced to 10 years in Federal prison.



James Webb Space Telescope Mirror at Goddard Space Flight Center

STATISTICAL DATA

TABLE 9: OFFICE OF INVESTIGATIONS COMPLAINT INTAKE DISPOSITION

Source of Complaint	Zero Files[a]	Administrative Investigations[b]	Management Referrals[c]	Preliminary Investigations[d]	Total
Hotline	39	9	5	16	69
All Others	37	22	2	49	110
Total	**76**	**31**	**7**	**65**	**179**

[a] Zero files are complaints for which no action is required or that are referred to NASA management for information only or to another agency.

[b] Administrative investigations include noncriminal matters initiated by the OIG Office of Investigations as well as hotline complaints referred to the OIG Office of Audits.

[c] Management referrals are complaints referred to NASA management for which a response is requested.

[d] Preliminary investigations are complaints where additional information must be obtained prior to initiating a full criminal or civil investigation.

TABLE 10: FULL INVESTIGATIONS OPENED THIS REPORTING PERIOD

Full Criminal/Civil Investigations[a]	31

[a] Full investigations evolve from preliminary investigations that result in a reasonable belief that a violation of law has taken place.

TABLE 11: INVESTIGATIONS CLOSED THIS REPORTING PERIOD

Full, Preliminary, and Administrative Investigations	107

Note: The NASA OIG uses closing memorandums to close investigations. Investigative reports are used for presentation to judicial authorities, when requested.

TABLE 12: CASES PENDING AT END OF REPORTING PERIOD

Preliminary Investigations	49
Full Criminal/Civil Investigations	131
Administrative Investigations	58
Total	**238**

TABLE 13: QUI TAM INVESTIGATIONS

Qui Tam Matters Opened This Reporting Period	3
Qui Tam Matters Pending at End of Reporting Period	4

Note: The number of Qui Tam investigations is a subset of the total number of investigations opened and pending.

TABLE 14: JUDICIAL ACTIONS

Total Cases Referred for Prosecution[a]	51
Individuals Referred to the Department of Justice[b]	46
Individuals Referred to State and Local Authorities[b]	5
Indictments/Informations[c]	15
Convictions/Plea Bargains	7
Sentencing/Pre-Trial Diversions	11
Civil Settlements/Judgments	2

[a] This includes all referrals of individuals and entities to judicial authorities.

[b] Number of individuals referred to Federal, state, and local authorities is a subset of the total cases referred for prosecution.

[c] This includes indictments/information on current and prior referrals.

TABLE 15: ADMINISTRATIVE ACTIONS

Referrals to NASA Management for Review and Response	11
Referrals to NASA Management – Information Only	49
Referrals to the Office of Audits	4
Referrals to Security or Other Agencies	1
Recommendation to NASA Management for Disciplinary Action	
Involving a NASA Employee	3
Involving a Contractor Firm	2
Involving a Contractor Employee	3
Other	
Recommendations to NASA Management on Program Improvements	
Matters of Procedure	7
Total	**75**
Administration/Disciplinary Actions Taken	
Against a NASA Employee	6
Against a Contractor Employee	6
Against a Contractor Firm	2
Procedural Change Implemented	3
Total	**17**
Suspensions or Debarments from Government Contracting	
Involving an Individual	8
Involving a Contractor Firm	3
Total	**11**

TABLE 16: INVESTIGATIVE RECEIVABLES AND RECOVERIES

Judicial	$15,683,341
Administrative[a]	$1,052,361
Total	**$16,735,702**
Total NASA	**$1,321,513**

[a] Includes amounts for cost savings to NASA as a result of investigations.

TABLE 17: WHISTLEBLOWER INVESTIGATIONS

Report No.	Title	Impact
O-GL-17-0153-MN	A Glenn Research Center (Glenn) safety engineer alleged he was subjected to reprisal by his supervisor for enforcing and reporting safety violations by visiting contractors at Glenn's Plum Brook Station	It was determined this complaint falls under the jurisdiction of the Office of Special Counsel and subsequently referred to this Office.

TABLE 18: SENIOR GOVERNMENT EMPLOYEE INVESTIGATIONS REFERRED FOR PROSECUTION

Case Number	Allegation	Referral Date	Disposition
17-0134-P	Alleged inappropriate sexual contact by supervisor	2/15/2017	The Department of Justice declined prosecution. Victim did not want to pursue charges, and subject stated that the action was unintentional.
16-0164-S	Employee arrested on drug charges at residence	1/17/2017	District Attorney declined to prosecute employee. Matter was referred to NASA Security.
16-0035-HL-S	Astronaut submitted $1,635 in false travel receipts for reimbursement	3/28/2016	The Department of Justice declined prosecution due to low dollar amount. Referred to NASA management. Employee resigned in lieu of demotion.

TABLE 19: SENIOR GOVERNMENT EMPLOYEE CASES NOT DISCLOSED TO THE PUBLIC

Case Number	Closure Date	Allegation	Disposition
15-0032-S	10/25/2016	Use of public office for private gain	**Unsubstantiated.** Investigation yielded no proof the employee used his position for private gain.
16-0030-S	11/09/2016	Procurement irregularities	**Resolved.** Employee mishandled proprietary information during a procurement. Management agreed to provide training to ensure proper handling of proprietary data.
16-0100-P	1/19/2017	Improper hire	**Unsubstantiated.** Hiring was conducted in accordance with merit system principles.
16-0206-P	10/19/2016	Violation of post-employment ethics restrictions	**Unsubstantiated.** Employee is not linked to any matter between NASA and his current employer.
16-0243-S	2/6/2017	Unauthorized use of a Government facility for personal storage	**Substantiated.** A Government facility was used to store personal vehicles through the Exchange and Morale Association Auto Club. Management acknowledged that Exchange bylaws were not followed. Bylaws were amended and vehicles were removed.
16-0352-S	11/02/2016	Alleged prohibited personnel practice – granting unfair advantage	**Unsubstantiated.** No evidence found that employee received unfair advantage during hiring process.
17-0003-HL-MR	12/06/2016	Questionable Senior Executive Service promotion by senior official	**Unsubstantiated.** Person in question was not selected and announcement was ultimately canceled. Management will review future announcements to ensure adherence to merit system principles.
17-0031-S	11/16/2016	Inappropriate comments on Internet	**Resolved.** Post, while offensive, was not criminal in nature. Supervisor and Security were notified.
17-0049-HL-S	12/08/2016	Hatch Act violation – use of Government email to correspond with a political campaign employee	**Unsubstantiated.** The NASA Office of the General Counsel previously referred complaint to the U.S. Office of Special Counsel, which ruled that the employee's actions did not constitute a violation of the Hatch Act.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LEGAL ISSUES

Image of Earth taken from the International Space Station

CIGIE COMPUTER MATCHING EXEMPTION WORKING GROUP

As part of the first meeting of the Council of Inspectors General on Integrity and Efficiency (CIGIE) Computer Matching Working Group, NASA OIG provided suggestions for effective and responsible use of the newly granted statutory exemption to the Computer Matching Act. The statute exempts OIGs from the requirements to seek computer matching agreements with other entities, to publish Federal Register notices of intent to match, to seek Data Integrity Board approval of matches, to furnish detailed reports on matching to Congress and the Office of Management and Budget, and to notify individuals that their records are subject to matching.

PRESENTATION TO AUSTRALIAN OFFICIALS

On March 22, 2017, Counsel to the NASA Inspector General presented to a representative of the Australian Embassy and to the legal counsel of Commonwealth Scientific and Industrial Research Organisation at NASA Headquarters. This organization is the Australian counterpart to NASA, but is similar in function to the National Science Foundation. NASA OIG Counsel discussed the Inspectors General Act and the OIG's authorities, structure, and responsibilities.

Vacuum Facility 5 of the Electronic Propulsion Laboratory at Glenn Research Center

REGULATORY REVIEW

During this reporting period, we reviewed 14 NASA regulations and policies under consideration by the Agency. The following are considered the more significant regulations and reviews.

NPR 8715.3, NASA GENERAL SAFETY PROGRAM REQUIREMENTS

NASA plans to update three chapters to NASA Procedural Requirements (NPR) 8715.3. The OIG offered comments on the aircraft management division director's independence and suggested that individuals appointed as "Authority Having Jurisdiction" at the Centers be encouraged to maintain specified professional certifications.

NPR 2190.1C, NASA EXPORT CONTROL PROGRAM

NPR 2190.1C provides requirements applicable to all NASA employees and support contractors involved in the transfer of commodities, software, or technologies to foreign entities. The Export Control Program ensures that exports and transfers to foreign entities are consistent with the U.S. Export Administration Regulations and the International Traffic in Arms Regulations. This NPR sets criteria for qualifying for applicable exceptions and exemptions, as well as complying with export control requirements, generally. The updates to the NPR were principally based on recommendations from the Government Accountability Office, the National Academy of Public Administration, and the NASA OIG.[30]

The NPR has also been updated to make U.S. Export Administration Regulations and the International Traffic in Arms Regulations definitions current based on recent export control reforms. The OIG reviewed the NPR to ensure that it is appropriately responsive to our audit recommendations, and we submitted several comments intended to clarify roles and responsibilities within the Export Control Program.

NPR 3713.2B, ALTERNATIVE DISPUTE RESOLUTION IN DISCRIMINATION COMPLAINTS

NPR 3713.2B establishes procedures and operating principles for Agency-wide Equal Employment Opportunity Alternative Dispute Resolution (ADR) activities. These procedures are intended to ensure the U.S. Equal Employment Opportunity Commission regulatory requirements and NASA policy directives are met and to ensure consistency across NASA Centers. The NPR does not apply to ADR activities in other areas such as employee performance/misconduct cases or whistleblower reprisal cases. In our review of the NPR, we noted that the OIG's whistleblower protection mandate, including conducting reprisal investigations and serving as NASA Whistleblower Protection Ombudsman, may necessitate the use of similar

[30] Government Accountability Office, "NASA Management Action and Improved Oversight Needed to Reduce the Risk of Unauthorized Access to Its Technologies" (GAO-14-315, April 2014); National Academy of Public Administration, "An Independent Review of Foreign National Access Management" (January 2014); and NASA OIG, "NASA's Implementation of Export Control and Foreign National Access Management Recommendations" (IG-16-022, May 26, 2016).

ADR services during the processing of whistleblower reprisal complaints. We have reached out to the Equal Employment Opportunity Office and the Office of General Counsel to explore the availability of ADR services for managing and resolving suitable whistleblower complaints.

NPR 9630 DRAFT 1, ACCOUNTS PAYABLE AND DISBURSEMENTS

NPR 9630 Draft 1 provides the requirements for the proper management of accounts payable. This includes the recognition, recording, and reporting of public and intra-governmental accounts payable, as well as the timely payment of invoices and the identification and reporting of irregularities. The OIG submitted several comments intended to clarify our proper role in identifying and resolving suspected improper payments, while maintaining the organizational independence required by the Inspector General Act.

NPR 9770 DRAFT 2, NASA CONFERENCE APPROVAL AND REPORTING

NPR 9770 Draft 2 provides the financial management requirements for conference planning, approval, attendance, and reporting. The NPR ensures that NASA makes the most cost-effective use of the resources it expends on conference sponsorship and attendance, and that it meets various legal and policy requirements relating to conferences. The OIG submitted comments intended to clarify the Inspector General's role as the final approving official for any conferences primarily funded or sponsored by the OIG.

STATISTICAL DATA

TABLE 20: LEGAL ACTIVITIES AND REVIEWS

Freedom of Information Act Matters	24
Appeals	0
Inspector General Subpoenas Issued	52
Regulations Reviewed	14


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APPENDIXES

Appendixes

Mission Control at Johnson Space Center

APPENDIX A. INSPECTOR GENERAL ACT REPORTING REQUIREMENTS

Inspector General Act Citation	Requirement Definition	Cross-Reference Page Numbers
Section 4(a)(2)	Review of legislation and regulations	63–64
Section 5(a)(1)	Significant problems, abuses, and deficiencies	17–41
Sections 5(a)(5) and 6(b)(2)	Summary of refusals to provide information	n/a
Section 5(a)(6)	OIG audit products issued – includes total dollar values of questioned costs, unsupported costs, and recommendations that funds be put to better use	44–47
Section 5(a)(8)	Total number of reports and total dollar value for audits with questioned costs	48
Section 5(a)(9)	Total number of reports and total dollar value for audits with recommendations that funds be put to better use	48
Section 5(a)(10)	Summary of audit, inspection, and evaluation reports	17–41
Section 5(a)(10)(A)	Summary of prior audit products for which no management decision has been made	46–47
Section 5(a)(10)(B)	Reports for which no Agency comment was provided within 60 days	n/a
Section 5(a)(10)(C)	Unimplemented recommendations and associated potential cost savings	44–47
Section 5(a)(11)	Description and explanation of significant revised management decisions	n/a
Section 5(a)(12)	Significant management decisions with which the Inspector General disagreed	n/a
Section 5(a)(13)	Reporting in accordance with Section 5(b) of the Federal Financial Management Improvement Act of 1996 Remediation Plan	n/a
Section 5(a)(14)	Peer review conducted by another OIG	73
Section 5(a)(15)	Outstanding recommendations from peer reviews of the NASA OIG	n/a
Section 5(a)(16)	Outstanding recommendations from peer reviews conducted by the NASA OIG	n/a

Inspector General Act Citation	Requirement Definition	Cross-Reference Page Numbers
Section 5(a)(17)(A)	Summary of investigations	51–53
Section 5(a)(17)(B) (C) and (D)	Matters referred to prosecutive authorities	56
Section5(a)(18)	Descriptions of table metrics	n/a
Section 5(a)(19)(A) and (B) (i)(ii)	Summary of investigations involving senior Government employees	57
Section 5(a)(20)	Summary of whistleblower investigations	57
Section 5(a)(21)(A) and (B)	Agency attempts to interfere with OIG independence	n/a
Section 5(a)(22)(A)	Closed inspections, evaluations, and audits not disclosed to the public	44
Section 5(a)(22)(B)	Closed investigations of senior Government employees not disclosed to the public	58

APPENDIX B. AWARDS

CIGIE AWARDS CEREMONY

CIGIE held its 19th Annual Awards Ceremony on October 20, 2016, to recognize the work of OIG employees across the Federal Government. Several NASA OIG employees and teams were honored.

Barry R. Snyder Joint Award

Office of Audits Director Mark Jenson was recognized for his contributions to the Federal Audit Executive Council Digital Accountability and Transparency Act of 2014 Working Group.

Award for Excellence, Audit

Members of the Office of Audits received an Award for Excellence in recognition of exceptional achievement and outstanding teamwork reviewing NASA's response to Orbital's 2014 launch failure of a cargo mission and its impacts on resupply of the ISS. The team included Ridge Bowman, Ray Tolomeo, Kevin Fagedes, Loretta Atkinson, Letisha Antone, David Balajthy, Sarah Beckwith, Cedric Campbell, Sashka Mannion, and Robert Proudfoot.

Award for Excellence, Investigation

John Womack of the Office of Investigations received an Award for Excellence in recognition of his contributions to a multi-agency effort that successfully identified pervasive corruption within a key part of the U.S. Government's aerospace supply chain.

Award for Excellence, Investigation

Elaine Mylod of the Office of Investigations received an Award for Excellence in recognition of her contributions while employed by the Defense Contract Audit Agency to the Quantell Investigation, a multi-year joint agency investigation that uncovered a complex $30 million employee benefit and Federal contract fraud scheme involving more than 1,000 victims.

Award for Excellence, Information Technology

Members of the Office of Management and Planning received an Award for Excellence in recognition of the delivery of cost-effective, secure, reliable, and innovative IT solutions to Offices of Inspector General across the Inspector General community. The team included Chris Han, Connie Rybicki, James Akers, Charles Cephas, Brian Hawkins, Dean Lefor, Edwin Noell, Terence Puls, Michael Riddle, Michelle Robertson, and William Todd.

EXCEPTIONAL SERVICE

In December 2016, Special Agent Michelle Batignani received an Exceptional Service Award from the Assistant Attorney General for the Criminal Division of the Department of Justice. Batignani and other recipients were recognized for their work in holding a U.S. Congressman and his co-conspirators accountable for a long-term corruption scheme involving the widespread abuse of public trust and millions of taxpayer dollars. For more information about this case, see the Office of Investigations section of this report.

APPENDIX C. DEBT COLLECTION

The Senate Report accompanying the supplemental Appropriations and Rescissions Act of 1980 (Pub. L. No. 96-304) requires Inspectors General to report amounts due the Agency, as well as amounts that are overdue and written off as uncollectible. NASA's Financial Management Division provides these data each November for the previous fiscal year. For the period ending September 30, 2016, the receivables due from the public totaled $762,970, of which $167,319 is delinquent. The amount written off as uncollectible for the period October 1, 2015, through September 30, 2016, was $1,239,719.

APPENDIX D. PEER REVIEWS

The Dodd-Frank Wall Street Reform and Consumer Protection Act requires the OIG to include in its semiannual reports any peer review results provided or received during the relevant reporting period. Peer reviews are required every 3 years. In compliance with the Act, we provide the following information.

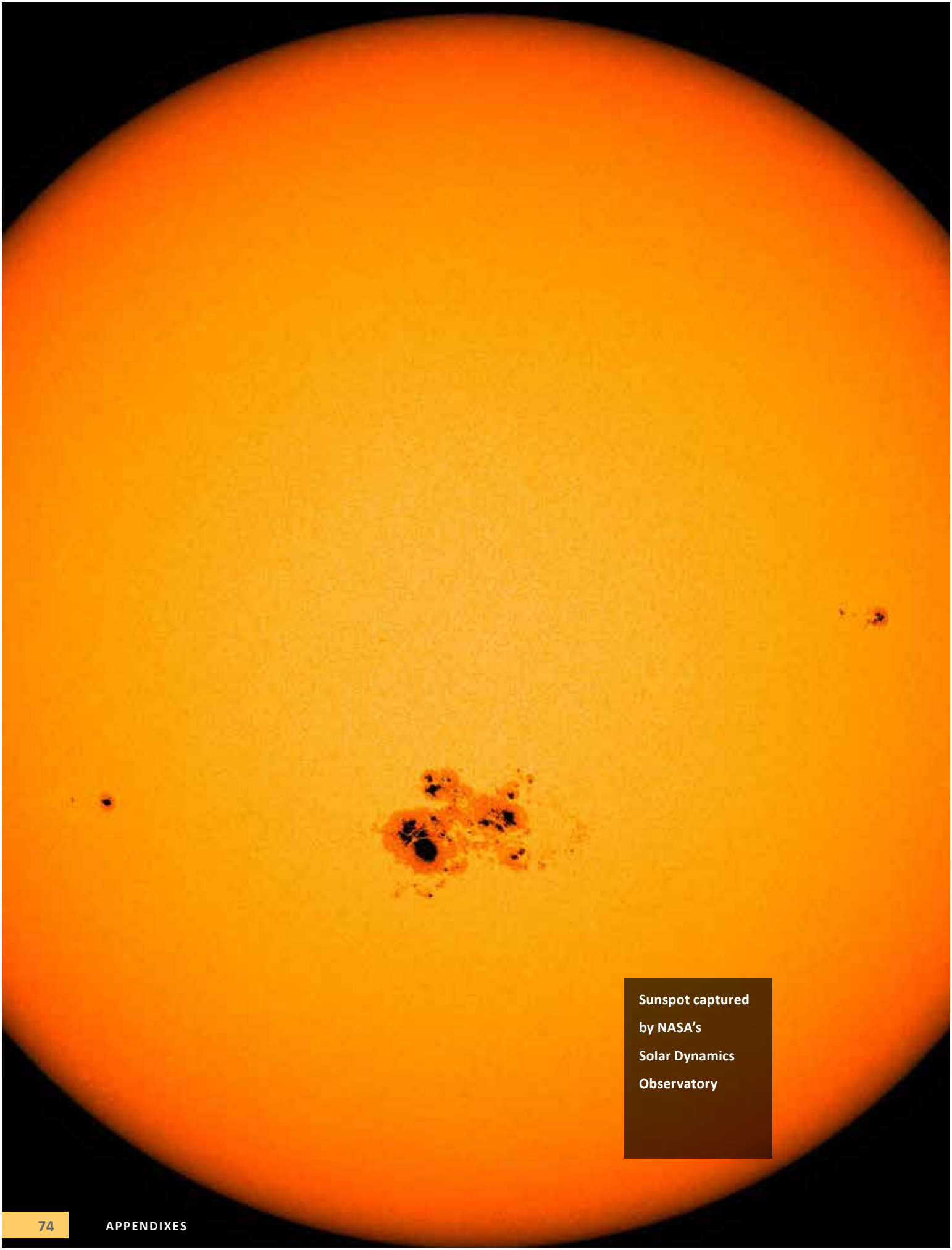
OFFICE OF AUDITS

No external peer reviews were conducted of or performed by our Office of Audits during this semiannual period. The date of the last external peer review of the NASA OIG was September 1, 2015, and it was conducted by the Department of State OIG. NASA OIG received a peer review rating of "pass," and there are no outstanding recommendations from the review.

The last peer review conducted by our Office of Audits examined the Special Inspector General for Afghanistan Reconstruction's audit organization and was completed March 30, 2016. There are no outstanding recommendations from that review.

OFFICE OF INVESTIGATIONS

No external peer reviews were conducted of or performed by the Office of Investigations during this semiannual period. In October 2014, the Department of Energy's OIG reviewed NASA OIG's Office of Investigations and found the office to be in compliance with all relevant guidelines. There are no unaddressed recommendations outstanding from this review.



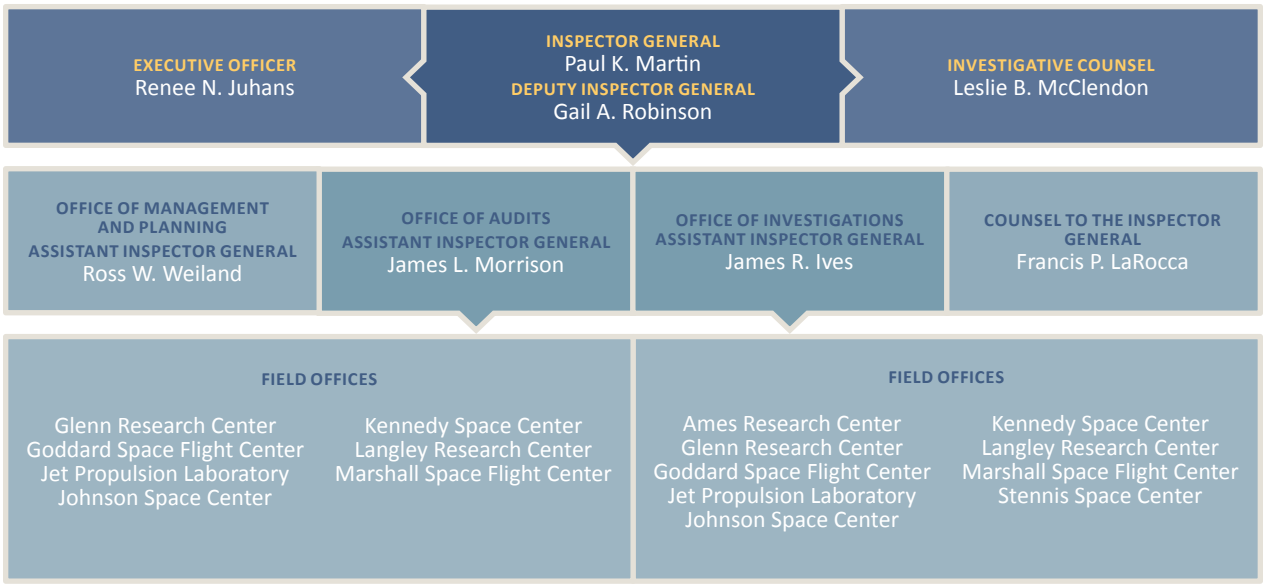
Sunspot captured by NASA's Solar Dynamics Observatory

APPENDIX E. ACRONYMS

ADR	Alternative Dispute Resolution
CASIS	Center for the Advancement of Science in Space
CIGIE	Council of the Inspectors General on Integrity and Efficiency
CLA	CliftonLarsonAllen LLP
CLM	Capability Leadership Model
DCAA	Defense Contract Audit Agency
EM-1	Exploration Mission-1
EM-2	Exploration Mission-2
EVS	Earth Venture Suborbital
FedRAMP	Federal Risk and Authorization Management Program
FISMA	Federal Information Security Modernization Act of 2014
FY	Fiscal Year
GSDO	Ground Systems Development and Operations
HSI	Homeland Security Investigations
ICE	U.S. Immigration and Customs Enforcement
ICESat-2	Ice, Cloud, and Land Elevation Satellite-2
ISS	International Space Station
IT	Information Technology
JCL	Joint Cost and Schedule Confidence Level
JWST	James Webb Space Telescope
MOXIE	Mars Oxygen In-Situ Resource Utilization Experiment
MSL	Mars Science Laboratory
NPR	NASA Procedural Requirement
OIG	Office of Inspector General
OT	Operational Technology
SBA	Small Business Administration
SBIR	Small Business Innovation Research
SCaN	Space Communications and Navigation
SLS	Space Launch System
SOFIA	Stratospheric Observatory for Infrared Astronomy
TCAT	Technical Capabilities Assessment Team

APPENDIX F. OFFICE OF INSPECTOR GENERAL ORGANIZATIONAL CHART

The OIG is currently funded under a continuing resolution at the FY 2016 level of $37.4 million. This budget supports the work of 192 employees in their audit, investigative, and administrative activities.



THE NASA OFFICE OF INSPECTOR GENERAL conducts audits, reviews, and investigations of NASA programs and operations to prevent and detect fraud, waste, abuse, and mismanagement and to assist NASA management in promoting economy, efficiency, and effectiveness.

THE INSPECTOR GENERAL provides policy direction and leadership for the NASA OIG and serves as an independent voice to the NASA Administrator and Congress by identifying opportunities for improving the Agency's performance. The Deputy Inspector General assists the Inspector General in managing the full range of the OIG's programs and activities and provides supervision to the Assistant Inspectors General and Counsel in the development and implementation of the OIG's diverse audit, investigative, legal, and support operations. The Executive Officer serves as the OIG liaison to Congress and other Government entities, conducts OIG outreach both within and outside NASA, and manages special projects. The Investigative Counsel serves as a senior advisor for OIG investigative activities and conducts special reviews of NASA programs and personnel.

THE OFFICE OF AUDITS conducts independent and objective audits and reviews of NASA programs, projects, operations, and contractor activities. In addition, the Office of Audits oversees the work of an independent public accounting firm in its annual audit of NASA's financial statements.

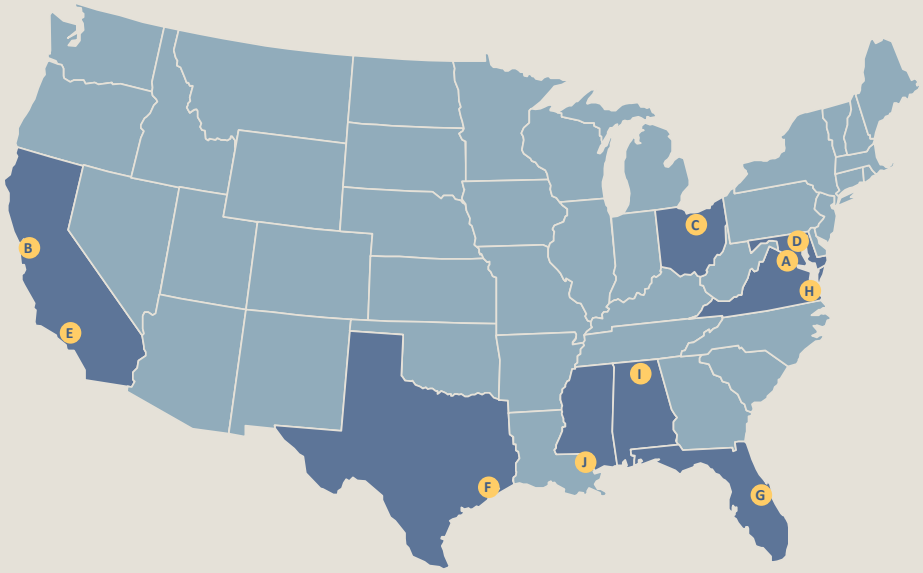
THE OFFICE OF COUNSEL TO THE INSPECTOR GENERAL provides legal advice and assistance to OIG managers, auditors, and investigators. The Office serves as OIG counsel in administrative litigation and assists the Department of Justice when the OIG participates as part of the prosecution team or when the OIG is a witness or defendant in legal proceedings. In addition, the Inspector General has designated the Counsel as Whistleblower Protection Ombudsman, and in that role he educates Agency employees about prohibitions on retaliation for protected disclosures and about rights and remedies for protected whistleblower disclosures.

THE OFFICE OF INVESTIGATIONS investigates allegations of cybercrime, fraud, waste, abuse, and misconduct that may affect NASA programs, projects, operations, and resources. The Office refers its findings either to the Department of Justice for criminal prosecution and civil litigation or to NASA management for administrative action. Through its investigations, the Office develops recommendations for NASA management to reduce the Agency's vulnerability to criminal activity and misconduct.

THE OFFICE OF MANAGEMENT AND PLANNING provides financial, procurement, human resources, administrative, and information technology services and support to OIG staff.

APPENDIX G. MAP OF FIELD OFFICES

NASA OIG OFFICES OF AUDITS AND INVESTIGATIONS



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