

National Aeronautics and
Space Administration

Office of Inspector General
Washington, DC 20546-0001



November 12, 2010

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Administrator

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SUBJECT: NASA's Top Management and Performance Challenges

As required by the Reports Consolidation Act of 2000, the enclosed report provides our views of the most serious management and performance challenges facing NASA. This document will be included in the Agency's Performance and Accountability Report for fiscal year 2010.

In determining whether to identify an issue as a top challenge, we consider the significance of the issue in relation to the Agency's mission; its susceptibility to fraud, waste, and abuse; whether the underlying matter is systemic; and the Agency's progress in addressing the challenge. To its credit, NASA has made a concerted effort over the past several years to improve its management practices and address weaknesses identified by the Agency, the Office of Inspector General (OIG), and other oversight bodies. Nevertheless, significant challenges remain across all NASA programmatic and functional areas.

We believe the following issues constitute the top management and performance challenges currently facing the Agency:

- Future of U.S. Space Flight
- Acquisition and Project Management
- Infrastructure and Facilities Management
- Human Capital
- Information Technology Security
- Financial Management

In finalizing this report, we provided a draft copy of our views to Agency officials and considered all comments received.

Finally, during the coming year the OIG will continue to conduct audits, investigations, and reviews that focus on NASA's efforts to address these and other important challenges. We hope that you find this report helpful.

Enclosure

NASA's Top Management and Performance Challenges

November 2010

Introduction

Throughout the past year, NASA has been in the midst of its most significant period of transition since the end of the Apollo era: the Space Shuttle is close to retirement after 30 years and more than 130 flights; construction of the International Space Station (ISS) is complete; and the future of the Constellation Program, the Agency's marquee human space flight program, was in doubt. Enactment of the National Aeronautics and Space Administration Authorization Act of 2010 (Authorization Act) in October clarified several important aspects of NASA's future mission, including clear direction to cancel much of the Constellation Program in favor of commercially operated crew transportation to the ISS and a detailed directive to develop a multi-purpose crew vehicle and heavy-lift launch system. However, NASA (and all other Federal Government agencies) remains in a holding pattern with respect to receiving its full fiscal year (FY) 2011 funding at least until December 2010. Until its FY 2011 appropriation is enacted, NASA is limited in the steps it can take to close out the Constellation Program and move forward on the priorities outlined in the Authorization Act. Consequently, one of the top challenges for NASA leadership is to manage the Agency's portfolio of core science, aeronautics, and human space flight and exploration missions amid this continuing lack of clarity. Moreover, when a FY 2011 budget is enacted NASA managers will need to reconcile any differences between the appropriations legislation and the Authorization Act.

To its credit, NASA has made a concerted effort over the past several years to improve its management practices and address systemic weaknesses identified by the Agency, the Office of Inspector General (OIG), and other oversight bodies. Nevertheless, significant challenges remain across all NASA programmatic and functional areas. This annual report highlights several issues we believe pose the top management and performance challenges to NASA leadership, specifically:

- Future of U.S. Space Flight
- Acquisition and Project Management
- Infrastructure and Facilities Management
- Human Capital
- Information Technology Security
- Financial Management

In deciding whether to identify an issue as a top management and performance challenge, we considered the significance of the issue in relation to the Agency's mission; its susceptibility to fraud, waste, and abuse; whether the underlying issues are systemic in nature; and the Agency's

progress in addressing the challenge. Several of these challenges, specifically acquisition and project management and infrastructure and facilities management, are long-standing concerns likely to remain top challenges for the foreseeable future. However, with focused and sustained efforts we believe that NASA leaders can make significant strides in addressing all of these challenges.

1. Future of U.S. Space Flight

Throughout NASA's history, transitioning from a legacy flight system to the next system has always presented significant challenges. The retirement of the Space Shuttle Program and transition to the next generation of space vehicles is no exception.

The Shuttle Program, originally planned for retirement at the end of FY 2010, will now continue to fly well into FY 2011. Moreover, after extensive cost and schedule overruns, concerns about adequate long-term funding, and much political debate, the Constellation Program – which was expected to produce the next generation of NASA space vehicles – has been terminated, surviving only in the form of as yet undefined crew transport and heavy-lift vehicles.

Moreover, the Agency's efforts to stimulate the emerging U.S. commercial space industry to more independently develop vehicles to transport cargo and crew represent a departure from NASA's past approach to space flight and consequently present a significant management challenge.

Transition and Retirement of the Space Shuttle Program. Foremost among NASA's Shuttle-related priorities is the need to safely complete the Program's two or three remaining flights. At the same time, transitioning from and retiring the Space Shuttle Program presents one of the top challenges facing the Agency. As the OIG noted in its March 2010 report, "Review of NASA's Progress on Retiring the Space Shuttle Program," NASA was unable to complete the remaining planned Shuttle flights by the end of FY 2010 as initially planned, and rescheduled the final flights for November 2010 and February 2011.¹ While the Authorization Act provides for an additional Shuttle mission to be flown no earlier than June 1, 2011, it remains to be seen whether NASA will obtain the funding needed to support this extra flight.

In addition to managing Shuttle funding challenges, the transition and retirement activities associated with the end of the Shuttle Program present one of the largest such efforts ever undertaken by NASA. The Shuttle Program is spread across hundreds of locations, occupies over 654 facilities, and involves more than 1.2 million line items of personal property with a total equipment acquisition value exceeding \$12 billion. The challenge of dealing with all of this infrastructure and personal property has been further complicated by termination of the Constellation Program, which was slated to use much of the Shuttle Program's infrastructure, and language in the Authorization Act that directs NASA to develop a multi-purpose crew vehicle and heavy-lift launch system. The OIG is currently examining NASA's transition and retirement efforts for the Shuttle Program given the significance and magnitude of this effort.

¹ NASA's attempt to launch space shuttle Discovery in early November was thwarted by a series of technical problems. The mission was rescheduled for launch no earlier than November 30, 2010.

Finally, Agency managers continue to address the challenge of retaining the skilled workforce necessary to safely fly out the remaining Shuttle missions while simultaneously making personnel cuts necessary to retire the Program.

Commercial Launch Providers. Once the Space Shuttle has flown its last flight, NASA will need to rely on other countries for access to the ISS until either it develops its own follow-on system or a commercial vehicle is proven capable of carrying cargo and humans into space. With respect to cargo, NASA has been working to develop commercial providers for the past several years through its Commercial Orbital Transportation Services (COTS) Program. After a series of delays, the first COTS demonstration flight is scheduled for December 2010 by Space Exploration Technologies Corporation (SpaceX).

Efforts to develop commercial vehicles capable of carrying humans to the ISS and other low Earth orbit destinations present significant challenges. One issue of particular complexity is NASA's intent to "human-rate" any new flight system, whether developed commercially or by NASA. NASA only recently developed comprehensive human-rating standards for NASA-developed systems, and the certification process that will be used to human-rate commercial vehicles – several of which are already well under development – is not yet fully defined. Given the importance of this issue, the OIG is examining NASA's development of human-rating standards for commercial vehicles and will evaluate how commercial space transportation providers intend to implement NASA's safety and human-rating requirements.

Adding to this challenge is NASA's need to select an acquisition strategy for developing a commercial capability for crew transportation. Specifically, NASA must decide how it intends to partner with commercial providers in the development of new space vehicles for human space flight. In doing so, NASA must balance its role as a partner of commercial providers with its responsibility to ensure that commercially produced vehicles are safe for NASA astronauts.

NASA also faces challenges related to the U.S. market for medium-class launch vehicles suited for many NASA science missions, a market segment that has suffered from foreign competition and lack of demand by non-Government customers. While new launch vehicles in this class are currently under development as part of NASA's COTS Program, in the near-term NASA faces limited domestic availability of medium-class launch vehicles for its science missions. This situation has been exacerbated by the Department of Defense's decision to stop using the Delta II, the medium-class launch vehicle that has been NASA's launch vehicle of choice for nearly 60 percent of its science missions over the last decade.

NASA Transportation Systems. The Authorization Act represents somewhat of a compromise between those who believe NASA should continue to develop its own space transportation systems (like Constellation) and those who believe NASA should rely on commercial launch providers for access to the ISS and low Earth orbit. Specifically, the Act directs NASA to foster development of commercial cargo and crew capabilities while simultaneously developing its own launch system and crew vehicle. Addressing both of these responsibilities presents a significant management challenge for NASA leadership.

Moreover, the level of specificity contained in the Authorization Act regarding the design and development of NASA's launch system presents its own challenges. For example, the

Authorization Act directs NASA to develop a heavy-lift vehicle capable of reaching and transiting beyond low Earth orbit, carrying a new crew vehicle, and serving as a backup for supplying cargo and crew to the ISS. In addition, the Authorization Act encourages the extension of existing vehicle development contracts associated with the Constellation Program. This latter directive may limit NASA's ability to move away from the design of the Constellation launch vehicle to explore alternative architectures.

Similarly, the crew vehicle called for in the Authorization Act appears similar in design to the Constellation Program's Orion Crew Exploration Vehicle. However, the history and development challenges of Orion have been well documented by the Government Accountability Office (GAO), the NASA Advisory Council, and the Aerospace Safety Advisory Panel. For example, because of concerns about excess weight and in order to improve schedule and cost confidence, the original six-person design was modified in 2009 to a four-person configuration.

International Space Station. After years of development, construction of the ISS is complete. The Authorization Act extends the life of the ISS until at least 2020 and directs NASA to maximize its productivity and use with respect to scientific and technological research and development, advancement of space exploration, and international collaboration. The Act also instructs NASA to provide initial financial assistance to and enter into a cooperative agreement with a non-profit organization to manage the activities of the ISS national laboratory. Both of these directives present significant management challenges. As discussed above, the retirement of the Space Shuttle signals an end to the United States' ability, at least in the short term, to transport supplies and experiments to the ISS, and NASA will be dependent upon the Russians to transport astronauts to the ISS until commercial vehicles are available. In addition, NASA needs to continue to develop incentives and partnerships to encourage use of the ISS by other U.S. Government agencies, other nations, and the commercial sector.

2. Acquisition and Project Management

Effective acquisition and project management are critical to NASA's ability to achieve its overall mission, but systemic weaknesses in these areas have proven a long-standing challenge for the Agency. The OIG is focusing increased attention on these issues to help ensure that NASA is paying contractors in accordance with contract terms and is receiving what it paid for on schedule.

Cost and Schedule Estimates. NASA historically has struggled with establishing realistic cost and schedule estimates for the projects in its portfolio, with OIG and GAO reviews identifying cost growth and schedule slippage in the majority of the Agency's major projects.

Both the OIG and GAO have found that cost growth and schedule slippage in NASA programs is often due to the Agency's failure to address systemic acquisition management weaknesses related to requirements growth, cost estimating, technology development, design stability, funding, and system integration. For example, in February 2010 GAO conducted an assessment of NASA's 19 most costly projects (combined life-cycle cost of \$66 billion) and found that within the last 3 years, 10 of the 19 projects experienced cost growth averaging \$121.1 million or

18.7 percent, while the average schedule delay was 15 months.² GAO found that the cost growth and schedule slippage resulted, in part, from failing to adequately identify requirements and underestimating complexity and technology maturity.

One program in particular, the James Webb Space Telescope, is emblematic of the problems NASA has faced in developing realistic cost and schedule estimates. In July 2003, NASA scheduled the Webb Telescope for launch in August 2011 at an estimated cost of \$1.6 billion. In succeeding years, the planned launch date slipped to June 2014 and the estimated total life-cycle cost increased to \$5.09 billion. Concern over growing cost and schedule delays with Webb prompted a June 2010 congressional request for an independent review of the program. This assessment, released publicly on November 10, cited problems with budgeting and program management rather than technical performance as the reasons for the delays and increases in costs for NASA's flagship science project. The report concluded that Webb's earliest possible launch date of September 2015 was dependent on the project making a series of critical management changes coupled with an infusion of an additional \$500 million over and above the funds already identified for the project in the President's FY 2011 and FY 2012 budget profile.

Project Management. To execute projects within established cost and schedule estimates, NASA needs to maximize the use of a wide range of project management tools including earned value and risk management. While effective project management historically has been a major challenge, NASA has shown that it can use these project management tools to produce positive results. For example, during the past year we found that managers for the Tracking and Data Relay Satellite (TDRS) K and L Project implemented a robust risk management process and made informed decisions based on earned value management data. As a result, development of two replacement satellites was within budget and on schedule. Conversely, NASA's Stratospheric Observatory for Infrared Astronomy (SOFIA) Program lacked an effective cost control process and experienced such significant cost growth early in development that the project was nearly canceled. Even though TDRS K and L are the 11th and 12th satellites built for the program while many other NASA projects are unique instruments, the challenge for NASA is to use sound management tools to identify and mitigate programmatic risks in all of its projects.

Contract Management. NASA spends approximately 85 percent of its \$18 billion budget on contracts and awards. Given the significant amounts of taxpayer funds at risk, continued findings by the OIG and GAO identifying systemic weaknesses in NASA's contract management practices illustrate that this issue remains a top Agency challenge. For example, the OIG has identified instances of fraud, waste, and abuse by program participants that bring into question the effectiveness of the internal controls in NASA's Small Business Innovation Research (SBIR) Program. OIG investigations have found that some award recipients received multiple SBIR contracts for essentially the same research and provided duplicate deliverables or questionable research products. An ongoing OIG audit of NASA's SBIR Program is examining whether Program management has implemented adequate internal controls to ensure the contract funds are appropriately spent. In addition, the audit is reviewing whether SBIR contracts contain unallowable and unsupported costs.

² GAO: "NASA: Assessments of Selected Large-Scale Projects" (GAO-10-227SP, February 1, 2010).

In another area of contract management, we found that NASA could improve its award fee structure in some contracts to motivate higher performance. For example, NASA's contract with the Zero Gravity Corporation (Zero G) to provide microgravity flight services permits the company to earn 100 percent of the available award fee if Zero G flies only 60 percent successful parabolas. We recommended that NASA revise the contract's performance-based payment structure so that payments more accurately reflect the contractor's performance.

GAO has also reported that NASA's award-fee payments to contractors did not always translate into desired program outcomes. For example, NASA paid the contractor for the Earth Observing System Data and Information System 97 percent of the available award fee despite a delay in completion of the contract of over 2 years and an increase in cost of more than 50 percent.³ The GAO also found that NASA had not evaluated the overall effectiveness of award fees and did not have metrics in place for conducting such evaluations. The report made a series of recommendations, which NASA has since implemented, aimed at tying award-fee payments to desired outcomes. Because cost-plus-award-fee contracts account for almost half of NASA's obligated contract dollars, NASA will continue to face challenges in this area.

3. Infrastructure and Facilities Management

NASA is the ninth largest Federal Government property holder, controlling a network of approximately 5,400 buildings and structures that support Agency research, development, and flight activities. NASA's ability to effectively manage the necessary maintenance and renovation of this large and aging portfolio of facilities is a critical challenge facing the Agency.

Maintenance, Repair, and Use of Aging Facilities. For years, NASA has struggled with its aging and underutilized infrastructure and the related issue of managing its backlog of deferred maintenance projects. According to NASA's 2008 Real Property Asset Management Plan, approximately 10 to 50 percent of NASA's warehouses and 30 to 60 percent of its laboratories are underutilized. NASA officials also report that more than 80 percent of the Agency's facilities are 40 or more years old and beyond their design life. Under its current policy, NASA is required to maintain these facilities to keep them operational or, if they are not being used, to ensure they do not pose a safety hazard. In FY 2009, NASA reported spending approximately \$283 million to repair and maintain its facilities, while Agency-wide deferred maintenance costs that year were estimated at \$2.55 billion.⁴

The Aerospace Safety Advisory Panel cited NASA's aging facilities as an area of concern in its most recent annual report, and NASA's backlog of maintenance and repair projects has been cited by Congress for several years. Moreover, a 2010 report from the National Research Council cited a "steady and significant decrease in NASA's laboratory capabilities, including equipment, maintenance, and facility upgrades" that require more maintenance than funding permits.

³ GAO: "NASA Procurement: Use of Award Fees for Achieving Program Outcomes Should Be Improved" (GAO-07-58, January 17, 2007).

⁴ NASA Annual Performance Metrics Report.

NASA's 2008 Authorization Act directed the Administrator to "determine and prioritize the maintenance and upgrade backlog at each of NASA's Centers and associated facilities, and . . . develop a strategy and budget plan to reduce that maintenance and upgrade backlog by 50 percent over the next five years." However, according to Agency officials funding constraints over the years have resulted in little reduction in NASA's backlog of deferred maintenance projects. Similarly, the recently enacted 2010 Authorization Act requires NASA to examine its structure, organization, and institutional assets and develop a strategy for the most efficient retention, sizing, and distribution of facilities and other infrastructure consistent with NASA's mission. Compiling such a report is difficult enough, but even more daunting is obtaining the funds necessary to repair and maintain NASA's key aging facilities or building a consensus on which facilities and infrastructure the Agency can no longer afford to support.

The OIG is currently evaluating NASA's efforts to effectively select and fund maintenance projects to reduce its deferred maintenance backlog. Specifically, we are examining whether NASA Centers appropriately communicated funding priorities and needs in the budget process and accurately captured costs associated with maintenance and repair activities in a consistent manner. In addition, the OIG recently initiated a second facilities-related audit evaluating NASA's response to requirements in the 2010 Authorization Act to re-scope and, as appropriate, downsize NASA's facilities footprint.

The ongoing challenge for NASA leadership in this area is to reduce the backlog of essential maintenance projects. Failure to do so will further increase the risk that Agency facilities will not be available for future use or will pose additional risks to the safety of personnel and equipment and the accomplishment of NASA's missions. Moreover, continuing to "kick the can down the road" by failing to take action to renovate essential facilities will result in higher costs to repair these facilities in the future.

Enhanced Use Leasing. As discussed previously, NASA has an excess of real property and faces considerable challenges addressing the maintenance needs of its aging facilities. Enhanced Use Leasing (EUL) offers the Agency one tool to help address this challenge. EUL authority allows agencies to retain proceeds from leasing out underutilized real property to private sector and other non-Federal governmental entities and to accept in-kind consideration in lieu of cash for rent.

Congress granted NASA limited EUL authority in FY 2003 and at that time NASA began demonstration programs at Ames Research Center and Kennedy Space Center. The GAO reviewed NASA's use of EULs in 2007 and found the Agency was using EUL authority to develop underutilized office space, unique research and development facilities, and land.⁵ As reported for FY 2009, NASA had realized about \$3.4 million in net revenue and over \$530,000 of in-kind consideration, most of which would not have been realized without EUL authority.

A leasing study prepared by NASA in 2009 in response to a congressional directive highlighted several challenges the Agency faces in expanding its use of EUL authority. For example, NASA must ensure that the methodology it uses for determining leasing costs are consistent with normal real estate practices and that lease rates are fair and reasonable. The study also noted that the

⁵ GAO: "NASA: Enhanced Use Leasing Program Needs Additional Controls" (GAO-07-306R, March 1, 2007).

costs of NASA's unique facilities and capabilities are embedded in NASA's overall real property costs and therefore the cost of leasing a NASA site is generally more expensive than the cost of private sector facilities. In addition, the costs associated with repairing NASA's aging facilities may be an obstacle to attracting potential tenants.

NASA will need to address these and other challenges in order to use its EUL authority to its full potential. EULs offer NASA the incentive to more fully utilize its facilities, which could help reduce the overhead costs associated with operating NASA Centers. Revenue from EULs also could be used by NASA to reduce the costs of maintaining its aging infrastructure.

4. Human Capital

The impending retirement of the Space Shuttle and NASA's redirection from the Constellation Program to support for development of commercial space flight capabilities present the Agency with the significant challenge of balancing its workforce structure with the needs of its shifting missions. As NASA reassesses its acquisition and workforce transition plan, the OIG will continue to monitor the Agency's progress in addressing these changing human capital challenges.

Attracting and Retaining a Highly Skilled Workforce. Maintaining a highly skilled, diverse, results-oriented civilian and contractor workforce is vital to successfully accomplishing NASA's mission. As the Agency's mission changes, NASA faces increasing competition from the private sector for the best scientific and engineering talent. Moreover, as its workforce ages NASA will face particular challenges in attracting and retaining highly specialized skill sets to sustain key Agency capabilities.

With regard to its future workforce, NASA plays a leading role in the Federal Government's efforts to inspire interest in science, technology, engineering, and mathematics (STEM). Through its Summer of Innovation Program, NASA seeks to engage students in NASA's mission and strengthen the Nation's future workforce through intensive summer teaching and learning experiences. NASA also sponsors competitions like the "Environmentally Responsible (Green) Aviation High School Student Challenge," which invites students to propose ideas and designs for future aircraft that use less fuel, produce less harmful emissions, and make less noise, and offers internships and fellowships in a wide variety of disciplines for both high school and college students. NASA will need to continue to use these and other innovative means to help meet its future workforce needs.

Future of the Astronaut Corps. Identifying the proper role and size of NASA's Astronaut Corps in a post-Space Shuttle environment presents special challenges to Agency leaders. Since its inception in 1959, the Astronaut Corps has been an integral part of the NASA mission and over the years the Agency's astronauts have adapted to a variety of new roles and missions. The cancellation of the Constellation Program and the increased reliance on the private sector to provide transportation to and from space raises new questions for the future of NASA's Astronaut Corps. NASA has taken an important step to address this management challenge by enlisting the National Research Council to conduct an independent study examining the role and size of the Astronaut Corps following the Shuttle's retirement.

In addition to recent changes in NASA's mission and direction, a series of long-standing challenges remain in this area. For example, NASA must ensure that astronauts maintain medical eligibility for missions as they age and increase their accumulated radiation exposure. Further, NASA has not fully identified how the Astronaut Corps in a post-Space Shuttle world will retain the skills necessary to perform the ISS mission with limited flight opportunities following the Shuttle's retirement in 2011.

Ensuring that Agency Employees Comply with Ethical Responsibilities. NASA employees routinely work side-by-side with contractors, international partners, and researchers from academia. Many NASA employees also seek opportunities in the private sector following their Government employment and others move between jobs in the private sector and NASA. These conditions pose particular challenges to NASA leadership to ensure that employees abide by ethics laws and regulations. Moreover, as NASA moves more deeply toward privatization of space exploration, this challenge may increase in both scope and complexity.

Ethics issues continue to account for a significant portion of the OIG's investigative caseload. For example, in a recent case a senior NASA manager was convicted of a conflict of interest charge in connection with his participation in NASA contracts given to a company owned by his wife. Another senior NASA manager used a majority of the \$1.5 million discretionary fund he controlled to initiate several studies that financially benefited him and others. Further, a high-ranking NASA official was convicted of steering a \$10 million contract to a consulting client and later entered a guilty plea to conspiracy charges in connection with actions he took to obtain and receive funds from a sole-source contract.

It is imperative that NASA employees, as stewards of the Agency's budget, remain aware of and comply with appropriate ethics laws and regulations. The OIG will continue to work with Agency officials to address potential ethics issues through a combination of training and enforcement.

5. Information Technology Security

NASA information technology (IT) systems and networks control spacecraft, collect and process scientific data, and enable NASA personnel to collaborate with their colleagues around the world. Users of these systems number in the hundreds of thousands and include NASA personnel, contractors, academia, and the public. As computer technology has advanced, NASA has become dependent on computerized information systems to carry out daily operations and to process, maintain, and report essential information. Although most NASA IT systems contain data that may be widely shared, others house sensitive information which, if released or stolen, could result in significant financial loss or adversely affect national security. Accordingly, it is imperative that NASA properly protect its IT systems and networks.

Role of the Chief Information Officer. Achieving the Agency's IT security goals will require sustained improvements in NASA's overarching IT management practices. Federal law and NASA policy designate the Headquarters-based Chief Information Officer (CIO) as the NASA official responsible for developing IT security policies and procedures and implementing an Agency-wide IT security program. However, we have found that the CIO has limited ability to

direct NASA's Mission Directorates to fully implement IT security programs, and consequently key Agency computer networks and systems operated by the Mission Directorates do not consistently comply with Agency-wide IT policy. Until the Mission Directorates fully implement NASA's IT security programs, the Agency will continue to be at risk for security incidents that can have a severe adverse effect on Agency operations, assets, or individuals.

IT Security Weaknesses. While the Agency reduced the severity of IT security from a material weakness to a significant deficiency in 2008 for purposes of the Administrator's Annual Statement of Assurance, recent audit work by the OIG found that significant obstacles remain in NASA's effort to develop a highly effective IT security program.

As part of our FY 2009 and FY 2010 Federal Information Security Management Act (FISMA) audits, we found that NASA's IT security program had not fully implemented key requirements needed to adequately secure Agency information systems and data. For example, NASA did not meet FISMA requirements for annual security controls testing and contingency plan testing. In our judgment, these deficiencies occurred because NASA did not have an independent verification and validation function for its IT security program.

We also found that the Office of the Chief Information Officer (OCIO) had not effectively managed corrective action plans used to prioritize mitigation of IT security weaknesses. This occurred because the OCIO did not have a formal policy for managing the plans and did not follow recognized best practices when it purchased an information system intended to facilitate Agency-wide management of IT corrective action plans. We found that the information system was significantly underutilized and therefore was not an effective tool for managing corrective action plans.

Through our audits and assessments during the past year, the OIG has found significant and recurring internal control weaknesses in NASA's IT security control monitoring and cybersecurity oversight. For example, we found that the Agency did not ensure that its computer servers remained securely configured over time. We also found that the Agency's vulnerability and patch management practices could be improved by adding a control to verify that 100 percent of the devices connected to NASA's networks undergo vulnerability and patch monitoring. We found control weaknesses related to user account management, the installation of unauthorized software, and inaccuracies with hardware and software inventories for a key NASA system. Finally, we found that the Agency's transition from Internet Protocol Version 4 (IPv4) to IPv6 needed substantial improvement.

Attacks on IT Infrastructure. The significance of NASA's IT security weaknesses is highlighted by the increasing number of cybersecurity threats facing the Agency. These threats are evolving, both in scope and sophistication, and present an ongoing challenge to NASA managers. For example, in May 2009 NASA notified the OIG of a suspicious computer connection from a system that supports NASA missions. The subsequent OIG investigation confirmed that cybercriminals had infected a computer system that supports one of NASA's mission networks. Due to the inadequate security configurations on the system, the infection caused the computer system to make over 3,000 unauthorized connections to domestic and international IP addresses including, but not limited to, addresses in China, the Netherlands,

Saudi Arabia, and Estonia. The sophistication of the attack confirms that this event was a focused and sustained effort to target NASA's data.

The OIG also alerted NASA to systemic IT deficiencies discovered during the course of an investigation into unlawful computer intrusions at the Jet Propulsion Laboratory (JPL). The OIG determined that the intrusions resulted in the theft of approximately 22 gigabytes of program data illegally transferred to an IP address in China. The stolen data included information protected under International Traffic in Arms Regulations and Export Administration Regulations. The OIG investigation found that a significant contributing factor to the theft was inadequate security settings at JPL, which allowed the intruder access to a wide range of sensitive data. NASA's challenge is to redouble its efforts to improve IT security to decrease the likelihood of similar incidents in the future even as the threat expands and the sophistication of the cyber attacks increases.

6. Financial Management

After receiving disclaimers of opinion on its financial statements during the previous 7 years, this year NASA was able to develop sufficient financial evidence and documentation to allow auditors to issue a qualified opinion on the Agency's FY 2010 financial statements. The qualification was related to the valuation of property, plant, and equipment (PP&E) and materials in prior years and its possible effects on the current year statements of net cost and changes in net position. Over the past several years, NASA financial managers – working with the OIG and the independent accounting firm – have continued to make steady progress resolving previously identified weaknesses and their efforts resulted in the auditors' qualified opinion. While the ultimate goal for the Agency is an unqualified opinion, the FY 2010 results are a significant accomplishment and position NASA well for the future.

During FY 2010, NASA continued to develop policies, procedures, and controls to address its internal control deficiencies. For example, NASA revised its policy and procedures for quantifying its environmental cleanup costs associated with decommissioning PP&E. Nevertheless, challenges remain. Specifically, NASA management and Ernst & Young LLP continue to identify deficiencies in the Agency's system of internal control surrounding contractor-held legacy PP&E. As shown in the following table, this deficiency was reported as a material weakness for several years.

Internal Control Deficiencies						
Fiscal Year		2010	2009	2008	2007	2006
Audit Opinion		Qualified	Disclaimer	Disclaimer	Disclaimer	Disclaimer
Internal Control Deficiencies	Property, Plant, and Equipment	significant deficiency	material weakness	material weakness	material weakness	material weakness
	Financial Statement Preparation Process and Oversight	—	—	material weakness	material weakness	material weakness
	Environmental Liability Estimation*	significant deficiency	significant deficiency	—	—	—
	Federal Financial Management Improvement Act*	—	significant deficiency	—	—	—

* The deficiency was included in the Financial Statement Preparation Process and Oversight weakness for FYs 2006–2008.

Property, Plant, and Equipment. NASA has struggled with asserting to the completeness and valuation of its legacy assets, the largest of which is the ISS. However, in October 2009 the Federal Accounting Standards Advisory Board issued an accounting standard clarifying that reasonable estimates of historical cost may be used to value general PP&E.⁶ Consequently, NASA’s challenge was to use this standard to value its legacy assets to resolve one of the key obstacles to obtaining an opinion in FY 2010.

In implementing this new standard, NASA considered using different sources to estimate historical capitalized amounts, such as appraisals and budget estimates, as alternatives to its historical approach of using contractor cost reports and capitalized amounts recorded in its Contractor-Held Asset Tracking System (CHATS).⁷ For the ISS, NASA determined that the CHATS figures provided the more precise estimate and therefore it would continue to use these figures to estimate the historical cost of the ISS.

However, while conducting routine analysis, NASA discovered an unexpected \$1.1 billion adjustment by a contractor in CHATS for materials that are considered depreciable property for the ISS. Upon further investigation, NASA determined that approximately \$470 million of this adjustment was the result of the contractor failing to report an increase when the underlying transaction occurred and that the remainder was a “double count” having previously been reported by the contractor. NASA appropriately never recorded this double count. Nevertheless, this discovery calls into question the rigor and effectiveness of the controls surrounding contractor reporting in CHATS and indicates that NASA needs to further develop its controls in this area.

⁶ Statement of Federal Financial Accounting Standard (SFFAS) No. 35, *Estimating the Historical Cost of General Property, Plant, and Equipment (Amending Statements of Federal Financial Accounting Standards 6 and 23)*.

⁷ CHATS is a Web-based application that contractors use to report to NASA summarized values of Government-owned materials and property in its possession.

Going forward, NASA needs to focus on fully implementing its PP&E capitalization policy and procedures for assets procured on or after October 1, 2007. For example, during FY 2010 testing the auditors identified two instances where completed and fully acquired assets were also recorded in the work-in-process account. As a result, the auditors could not conclude that NASA's controls in this area were operating effectively and had to expand their testing.

In addition to valuing legacy assets, NASA also must account for materials related to those assets, most of which are contractor-held. In light of the Space Shuttle's scheduled retirement, NASA considered whether any of the materials included in its reported balances were excess or obsolete to NASA. NASA determined that its current method for accounting for these materials did not reflect NASA's research and development mission and that a large majority of these materials would have no value by the end of the current fiscal year due to the Shuttle's retirement. Therefore, NASA adopted a change in accounting principle that permitted the removal of the entire \$2.7 billion materials asset line item from its balance sheet.

Prior to FY 2010, NASA did not capitalize property reported in year-end CHATS or other annual contractor reports because it had not analyzed the data prior to November 15 of each year. Instead, NASA recorded an accrual to estimate the value of contractor-held property as of September 30. As part of the preparation of the FY 2010 financial statements, NASA performed its analysis prior to November 15 for the first time and this analysis resulted in the Agency recording a \$661 million adjustment to contractor-held property. The size of the adjustment calls into question the sufficiency and basis of the methodology used to calculate these estimates.

Due to the volatility of NASA's property balances and the risk of recording estimates for property, accounting for PP&E remains a significant management challenge. Ongoing efforts by NASA management to develop a robust and rigorous review process that both validates and challenges the adequacy of estimation techniques and the sufficiency of supporting documentation are important in preparing for future audits of these estimates. The volatility and risk associated with these balances are expected to decline as legacy contracts conclude.