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NASA's Management of Spare Parts for its Flight Projects

October 5, 2017

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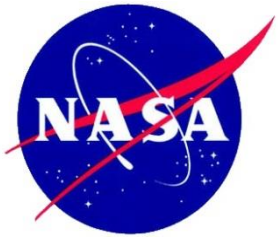

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RESULTS IN BRIEF

NASA's Management of Spare Parts for its Flight Projects

October 5, 2017 IG-18-001 (A-16-017-00)

WHY WE PERFORMED THIS AUDIT

Spare parts are critical to developing and maintaining NASA systems including aircraft, launch vehicles, spacecraft, satellites, ground communications, and ground support. These parts are used not just as replacements, but also as test articles and building blocks for possible follow-on missions. For example, NASA's next robotic rover mission to Mars – known as Mars 2020 – is leveraging heritage technology and using spare parts worth about $180 million left over from the Mars Science Laboratory, the Agency's most recent Mars rover mission launched in 2011.

As part of their duties, NASA program managers are responsible for ensuring adequate spare parts are available to support the full life cycle of their projects. In addition, each NASA Center has a Logistics Division responsible for managing Center assets, and this office is required to maintain comprehensive records of spare parts to help reduce costs by minimizing duplicate inventory. Moreover, NASA policy requires all assets be properly secured to protect from loss, theft, waste, and abuse.

In this audit, we assessed NASA's management of its spare parts inventory for flight projects and its efforts to reduce costs and leverage resources. Specifically, we evaluated whether NASA (1) has an effective process for procuring inventory for its flight missions, (2) properly accounts for and safeguards its inventory, (3) effectively leverages existing spare parts inventory to address the needs of new and ongoing missions, and (4) effectively identifies and disposes of spare parts when deemed unusable or when they reach the end of their service life. To complete this work, we visited Goddard Space Flight Center (Goddard), the Jet Propulsion Laboratory, Kennedy Space Center (Kennedy), and Marshall Space Flight Center (Marshall) to gain an understanding of their processes, controls, and systems for managing and physically securing flight inventory, including their use of NASA's Supply Management System (SMS) and Online Supply Catalog and Reservations (OSCAR) system. We also surveyed Centers we did not visit about their use of SMS and OSCAR, met with NASA Headquarters' Logistics Management Division personnel, and examined applicable documents related to spare parts management.

WHAT WE FOUND

While NASA Centers are required to use SMS to track their supply and material inventory, we found that five of nine are instead using stand-alone inventory control systems or other NASA systems to manage their flight inventory, including spare parts. These non-SMS systems contain over $252 million worth of flight inventory. As a result, Headquarters' Logistics Management Division's visibility into flight assets across the Agency and its ability to accurately account for flight inventory Agency-wide is limited and inconsistent.

In addition, NASA policy requires the use of existing resources when available, including flight spare parts, rather than acquiring new parts from vendors outside the Agency. When supply inventory is put into SMS, it automatically populates in OSCAR, a database personnel searching for potentially available flight inventory from their Center and other NASA locations should review before purchasing new items. However, most Center officials were either unaware of OSCAR or chose not to use it as a procurement source for flight inventory because of a lack of a standardized

cataloging process when inputting parts into SMS, the ability to procure parts through other systems, and an incorrect assumption that OSCAR was only available to Centers using SMS. Addressing these issues should enhance the Agency's efforts to effectively manage project costs and reduce the size of its spare parts inventory.

NASA policy also requires Centers to conduct periodic physical inventories to assess the accuracy of their flight inventory records and, at least every 5 years, a wall-to-wall inventory. While logistics officials at the four Centers we visited maintained and properly secured their flight inventory, Goddard and Kennedy did not consistently conduct complete reviews of their flight inventory due to ineffective oversight and communication by Headquarters' Logistics Management Division and failures by Center personnel to follow Agency requirements. Effectively procuring, accounting for, and managing flight inventory, including spare parts, could save money by using existing resources and providing personnel more accurate information to make prudent procurement decisions.

Finally, spare parts disposal practices need improvement at three of the four Centers we visited. NASA policy requires Centers to review assigned property, including flight spare parts, to identify items for retention or disposal and to provide applicable documentation for disposed inventory to Property Disposal Officers (PDO). We found Goddard did not make timely determinations to retain or dispose of some flight inventory; however, during the course of our review, Center officials started using a new flight supply inventory form to address these issues. Kennedy and Marshall did not consistently provide pertinent information to their PDOs for disposed inventory. Because of these factors, flight spare parts may be retained years after projects end, adding to NASA's excess inventory and impeding the potential use of these parts for other missions. In addition, failing to provide all applicable information for excessed flight spare parts could hinder NASA's efforts to obtain fair proceeds from selling these parts to outside entities.

WHAT WE RECOMMENDED

To increase accountability for and accuracy of NASA's flight spare parts inventory, we recommended the Assistant Administrator for Strategic Infrastructure (1) review each Center's SMS, stand-alone, and alternative inventory systems to reconcile differences and establish a methodology to ensure implementation of best practices and requirements regarding the procurement, use, storage, and disposal of flight spare parts; (2) work with the Centers not using SMS to develop a transition plan to bring the Center into compliance or submit waivers explaining why they should not be required to use the system; (3) develop a standardized cataloging process for OSCAR; (4) develop outreach tools to promote the benefits of using OSCAR; (5) develop alternative approaches to ensure Centers can meet the requirement to conduct complete reviews of spare parts inventories every 5 years; (6) develop a standardized Agency-wide form to identify parts for disposal or retention; and (7) develop procedures to ensure program and project officials provide all applicable documentation for disposed inventory.

In response to a draft of this report, NASA management concurred with our recommendations and described its planned actions. We consider management's comments responsive; therefore, the recommendations are resolved and will be closed upon verification and completion of the proposed actions.

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Acronyms

GSA	General Services Administration
JPL	Jet Propulsion Laboratory
MMS	Magnetospheric Multiscale Mission
MSL	Mars Science Laboratory
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
OCO	Orbiting Carbon Observatory
OIG	Office of Inspector General
OSCAR	Online Supply Catalog and Reservations
PDO	Property Disposal Officer
PP&E	Property, Plant, and Equipment
SAP	Systems Applications & Products
SMS	Supply Management System

INTRODUCTION

NASA needs a large supply of spare parts to support its scientific, aeronautics, and space exploration efforts, including such projects as the Mars Science Laboratory (MSL), Orbiting Carbon Observatory 2 (OCO-2), Low Boom Flight Demonstrator X-plane, and the Orion Multi-Purpose Crew Vehicle (Orion).[1] In addition to being used as replacements, these parts are used as test articles or building blocks for follow-on missions. For example, NASA's next robotic rover mission to Mars – known as Mars 2020 – is leveraging heritage technology and using flight spare parts worth about $180 million left over from MSL, the Agency's most recent Mars rover mission launched in 2011.

As part of their duties, NASA program managers are responsible for ensuring adequate spare parts are available to support the full life cycle of their projects. In addition, each NASA Center has a Logistics Division responsible for managing Center assets, including spare parts, which is required to maintain comprehensive records of spare parts to help minimize duplicate inventory and reduce costs. Finally, NASA policy requires all assets be properly secured to protect from loss, theft, waste, and abuse.[2]

This audit assesses NASA's management of its spare parts inventory for flight projects and its efforts to minimize costs and leverage resources.[3] Specifically, we evaluated whether NASA (1) has an effective process for procuring inventory for its flight missions, (2) properly accounts for and safeguards its inventory, (3) effectively leverages existing spare parts inventory to address the needs of new and ongoing missions, and (4) effectively identifies and disposes of spare parts when deemed unusable or when they reach the end of their service life. See Appendix A for details on our scope and methodology.

Background

Spare parts are critical to developing and maintaining a wide variety of systems including aircraft, launch vehicles, spacecraft, satellites, ground communications, ground support, and test materials. NASA policy requires the Assistant Administrator for Strategic Infrastructure to establish supply support and material management policies and assess their effectiveness.[4] NASA policy also states that Center Directors are accountable for providing management direction and the resources necessary for supplies and material inventory controls and accounting requirements at their respective Centers.[5] In turn,

[1] MSL is a robotic rover mission that since landing in August 2012 has studied Mars's habitability, climate, and geology while collecting data for future missions to the planet. Launched in July 2014, OCO-2 is a remote sensing satellite that studies atmospheric carbon dioxide from space. The Low Boom Flight Demonstrator X-plane is designed to demonstrate quiet supersonic flight over land and is expected to achieve its first flight by 2021. The Orion capsule is expected to transport astronauts beyond low Earth orbit.

[2] NASA Policy Directive (NPD) 4100.1C, "Supply Support and Material Management Policy," September 13, 2014.

[3] In this audit, we evaluated spare parts from NASA's launched, completed, or cancelled science and space missions. We did not evaluate spare parts for ground or operational missions, such as rocket propulsion test stands, wind tunnels, or the International Space Station.

[4] NPD 4100.1C.

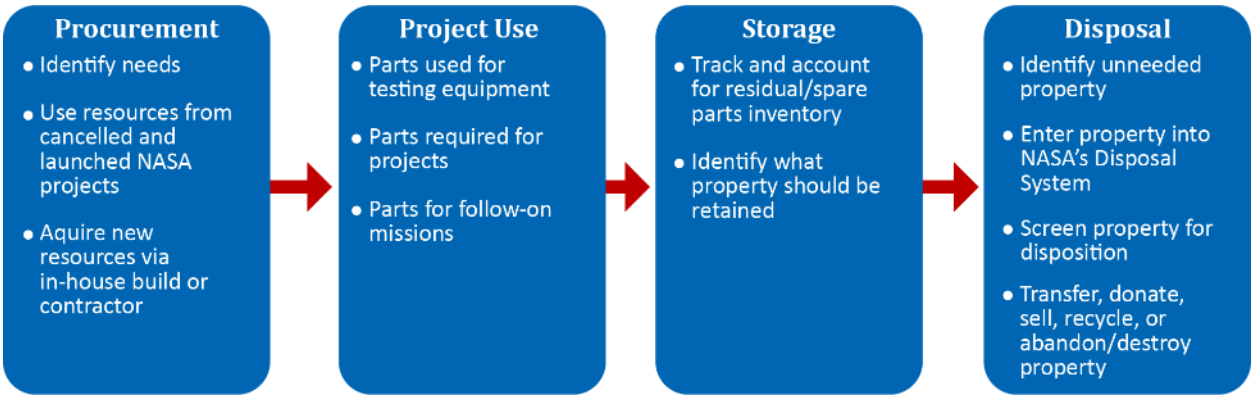
[5] NASA Procedural Requirements (NPR) 4100.1F, "NASA Supply Support and Material Management Procedural Requirements," March 7, 2017.

program and project managers are responsible for establishing supply support and material requirements for their programs and projects to ensure accurate accounting of spare parts and other stock.[6] For flight projects, the types of spare parts vary from electronic circuit board cables to high-gain antennas to microcircuits and valves.

Depending on the Center, NASA personnel, contractors, or both manage the Center's flight inventory either on-site or at offsite facilities. Centers are required to follow specific NASA policies to ensure proper management of NASA or contractor inventory located on-site for which the Center retains inventory accountability.

Inventory management is the process under which NASA procures, manages, catalogs, distributes, maintains, and disposes of assets, including spare parts. Figure 1 illustrates the spare parts inventory process.

Figure 1: Spare Parts Inventory Process



Source: NASA Office of Inspector General (OIG) analysis of NASA information.

[6] NPD 7500.1D, "Program and Project Life-Cycle Logistics Support Policy," March 2, 2015.

NASA policy requires use of existing resources when available, including flight spare parts, rather than acquiring new items.[7] Project managers must identify the parts necessary to support their missions and ensure an adequate number of those parts are replenished throughout the project's life-cycle.[8] Managers seek to implement procurement strategies to obtain optimum quantities of flight spare parts based on predicted usage, need, initial cost, life-cycle cost, and program maintenance philosophy. For example, OCO-2 project officials procured a full set of spare instrument components as a contingency in the event of project mishaps. In addition, flight projects such as MSL and Orion have procured spare parts from in-house facilities, contractors, and subcontractors for use as test articles, backups in case of failure, and for future use in possible follow-on missions. Some of these parts are one-of-a-kind specifically built for a particular project while others are easily obtainable on existing procurement contracts if additional units are necessary.

Mars Science Laboratory Spare Part - Mars Rover Support Stand

Source: NASA.

Tracking of Spare Parts

NASA's Logistics Management Division, part of the Office of Strategic Infrastructure at Headquarters, is responsible for all logistics material asset management and uses an Agency-wide database known as the Systems Applications & Products (SAP) Enterprise Resource Planning system to manage NASA's equipment, materials, and supplies. SAP in turn provides data to several other NASA systems including the Supply Management System (SMS) (discussed below); the Online Supply Catalog and Reservations (OSCAR) system used to identify and reserve inventory; the Property, Plant, and Equipment (PP&E) system used to identify, control, and account for NASA equipment; and the NASA Disposal System used to dispose of excess inventory. In addition, Logistics Management Division and Center personnel conduct Compensating Controls Reviews to evaluate the completeness and consistency of Centers' policy execution and procedural compliance with NASA Logistics Management Operations, reviews that examine supply, equipment, disposal, storage, warehousing, contract property management, mail management, and transportation management.[9]

NASA Centers are required to use SMS as the inventory system for tracking their supply and material inventory unless they are granted a waiver by the Headquarters' Logistics Management Division to operate a stand-alone inventory system.[10] SMS accounts for flight inventory, including flight spare parts, but not equipment or real property.[11] It classifies flight and non-flight inventory into three categories –

[7] NPD 1000.5B, "Policy for NASA Acquisition," December 19, 2013.

[8] NPD 7500.1D.

[9] NPR 4000.1, "NASA Logistics Management Operations Compensating Controls Reviews," April 9, 2010.

[10] NPR 4100.1F. The Jet Propulsion Laboratory (JPL) is a federally funded research and development center managed by the California Institute of Technology and is not contractually required to use SMS.

[11] Equipment is a tangible, durable, nonexpendable asset that is functionally complete for its intended purpose. Equipment includes all NASA personal property configured as mechanical, electrical, or electronic machines, tools, devices, and apparatuses that have a useful life of 2 years or more and is not consumed or expended in an experiment. Real property means land, buildings, structures, facilities, and leasehold improvements.

program, store, and standby.[12] The record for each item provides the quantity on hand, unit price, location, physical condition, and other information necessary to account for and identify each piece of inventory. As of June 2017, Headquarters' Logistics Management Division reported SMS contained 55,074 inventory line items valued at more than $364 million (see Table 1).[13]

Table 1: Inventory Reported in SMS by Headquarters

NASA Center	Program Stock	
	Line Items	Acquisition Cost
Ames Research Center	33	$364,440
Armstrong Flight Research Center	12	1,933
Glenn Research Center	862	38,451,694
Johnson Space Center	34,611	173,527,606
Langley Research Center	242	362,943
Marshall Space Flight Center	17,332	142,923,121
Stennis Space Center	1,982	8,849,415
Totals	**55,074**	**$364,481,152**

Source: NASA.

Note: The other three NASA Centers, Goddard Space Flight Center (Goddard), Kennedy Space Center (Kennedy), and the Jet Propulsion Laboratory (JPL) do not use SMS. Goddard uses a Center-developed system. Part of Kennedy's inventory is managed by a contractor who uses a proprietary inventory management system. JPL is a federally funded research and development center managed by the California Institute of Technology and is not contractually required to use SMS.

OSCAR is an Agency online stock catalog used to inform NASA personnel of potentially available inventory in SMS. When Center officials input their supply inventory into SMS, it automatically populates in OSCAR. The system is intended as a resource for programs and projects to obtain supplies and flight inventory before deciding to purchase the item. However, OSCAR does not contain any program stock information from three of six Centers that operate their own, stand-alone flight inventory systems or use another NASA inventory system.[14] For example, Goddard Space Flight Center (Goddard) employs a Center-developed stand-alone system; therefore, none of its flight inventory appears in OSCAR.

Property Disposal Officers (PDO) use the NASA Disposal System to manage the transfer, exchange, sale, abandonment, destruction, and disposal of NASA property, including flight inventory. When flight inventory is no longer needed, project officials are supposed to submit the parts to their Center Property Disposal Office.

[12] Program stock is hardware, materials, and supplies purchased and designated for a specific aircraft, unmanned aerial vehicle, program, or project. Store stock is inventory repetitively procured, stored, and issued such as consumables. Standby stock are those items held for emergencies such as personal protective equipment.

[13] A line item can contain one or more pieces of inventory.

[14] The three Centers are Goddard Space Flight Center, JPL, and Kennedy Space Center (Kennedy).

Reviewing and Disposing of Spare Parts

Project officials are responsible for continually reviewing their assigned property to identify items no longer needed for operational purposes, property that needs to be replaced, or property that should be deemed an artifact.[15] Depending on a Center's policies, project or property officials can decide whether to retain inventory for future projects. The process usually involves Center property officials contacting the program or project manager responsible for the spare part and inquiring whether it should be retained or excessed. Although Agency policy requires managers to provide retention justification in writing every 2 years, the frequency with which property officials inquire about a project's flight spare parts inventory varies widely by Center.[16] For example, Goddard property officials provide a listing of inventory in storage to project officials monthly, while the Jet Propulsion Laboratory (JPL) provides such a list annually.

Inventory determined to be excess and available for disposal is reported by a project official to the Center PDO. To enhance the usability of excessed inventory to prospective customers, property custodians are required to provide an accurate description of the items and other relevant information such as operating manuals and maintenance records.[17] Upon completion, the PDO coordinates with officials at the General Services Administration (GSA), who are responsible for providing excess personal property screenings by Federal agenices, as well as donations and sales.

Center inventory identified as excess should be listed in NASA's online disposal system so other Centers are able to view available property. PDOs also electronically transmit the report of excess inventory to GSA to maximize visibility throughout the Federal Government and private sector. However, for the first 21 days an item is listed, the Agency screens and has priority to claim NASA-posted items ahead of other Federal agencies. If after 21 days no agency requests the inventory, the items remain with NASA and the Agency's disposal division determines whether to keep, recycle, or sell the excess property. Any sale or transfer of property to a public, private, or state government entity is handled administratively through GSA.

[15] NPR 4300.1C, "NASA Personal Property Disposal Procedural Requirements," June 27, 2013. NASA defines artifacts as unique objects that document the history of the science and technology of aeronautics and astronautics. Their significance stems mainly from their relation to historic flights, programs, activities, or incidents; achievements or improvements in technology; understanding the universe; and important or well-known personalities.

[16] NPR 4100.1F.

[17] NPR 4300.1C.

NASA IS NOT PROPERLY ACCOUNTING FOR OR EFFECTIVELY USING AVAILABLE RESOURCES TO MANAGE FLIGHT INVENTORY

The majority of NASA Centers do not use the Agency's SMS to manage their flight inventory, which leaves NASA Headquarters unaware about how much flight inventory, including spare parts, Centers are maintaining. This practice – inefficient and inconsistent with NASA policy – limits Headquarters' Logistics Management Division's visibility into flight assets across the Agency and reduces its ability to accurately account for Centers' flight inventory. Additionally, most Centers are not using the OSCAR system as a resource when considering whether existing flight inventory spare parts meet their requirements prior to purchasing new parts from outside vendors. Furthermore, two Centers failed to conduct comprehensive internal reviews of their flight inventory as required. These shortcomings resulted from ineffective oversight and communication by Headquarters' Logistics Management Division, along with failures by Center personnel to follow Agency requirements. Effectively procuring, accounting for, and managing flight inventory, including spare parts, would save money by using existing resources and by providing project managers more accurate information to make prudent procurement decisions.

Limited Use of the Supply Management System

Five of the nine NASA Centers required to use SMS are not using that system to manage their flight inventory, including flight spare parts, and are instead using stand-alone inventory control systems or other NASA systems (see Table 2). Based on information we obtained from those five Centers, over $252 million worth of flight inventory is contained in these non-SMS systems. Officials from several of the Centers not using SMS explained that the system does not meet their needs for accounting and tracking flight inventory. Consequently, because these Centers do not use SMS to account for flight inventory, the information provided to us by Headquarters logistics management and Center logistics personnel were inconsistent. For example, although Headquarters logistics management reported in June 2017 that Marshall Space Flight Center (Marshall) had over $142 million worth of inventory program stock on hand based on SMS information, a Marshall official stated they had less than $37 million. A Marshall logistics official was not able to provide an explanation for this discrepancy. Neither Headquarters nor Marshall officials could explain how Marshall inventory information was recorded in SMS in light of the fact that according to Center logistics officials, it does not use the System to manage its flight inventory.

Table 2: NASA Center Use of the Supply Management System for Flight Inventory

NASA Centers	SMS Used	SMS Not Used
Ames Research Center	X	
Armstrong Flight Research Center		X
Glenn Research Center	X	
Goddard Space Flight Center		X
Johnson Space Center	X	
Kennedy Space Center		X
Langley Research Center		X
Marshall Space Flight Center		X
Stennis Space Center	X	

Source: Based on survey responses and interviews with NASA Center officials.

Consistent use of SMS across NASA to manage flight inventory would be beneficial by providing Headquarters' Logistics Management Division visibility into flight assets across the Agency and enhance its ability to accurately account for flight inventory Agency-wide.

Discrepancies on SMS Use

Headquarters and Center logistics officials have inconsistent understandings regarding Center use of SMS to account for and track flight inventory. According to a Headquarters logistics official and Headquarters-produced SMS reports, Armstrong Flight Research Center (Armstrong) and Langley Research Center (Langley) use SMS to manage their flight inventory, while Marshall uses the system for some but not all of its flight inventory. However, logistics officials we surveyed and interviewed at those Centers said they do not use SMS to manage their flight inventory. An Armstrong official stated they do not use SMS to manage their flight inventory. Additionally, a Langley official stated they only use SMS to manage non-flight inventory program stock. Furthermore, a Marshall official stated they do not use SMS to manage any of its flight inventory. Based on this and other findings, we question the accuracy of the information reported in SMS and do not believe it accurately depicts what flight inventory is currently maintained by or potentially available for use between the Centers.

NASA Requirements for Using SMS

NASA policy requires Centers to use an Agency standard data system to manage its program stock and, if not, to request a waiver from Headquarters' Logistics Management Division if they intend to manage their inventory using a different system.[18] Currently, SMS is the only standard data system logistics officials have identified available for this purpose. According to Headquarters' Logistics Management Division, as of May 2017 no Center had received permission via a waiver to use an alternative inventory

[18] NPD 4100.1C. JPL and other facilities with contractor-held or -owned property must comply with NASA Federal Acquisition Regulation Part 1845, "Government Property," which does not generally prohibit contractors from using its established property management systems to manage flight inventory. However, Centers such as Kennedy and Marshall must comply with NASA policy, as applicable, for managing its flight inventory.

system other than SMS. A Goddard logistics official told us they requested a waiver years ago but neither they nor Headquarters logistics officials had any record of such a request.[19]

In March 2017, NASA updated its policy to explicitly state that NASA Centers are required to use SMS to track and manage supplies and materials, including flight spare parts.[20] According to the policy, Centers need to apply for a waiver from Headquarters' Logistics Management Division if they decide not to use SMS and instead rely on a Center-based inventory system. According to Headquarters logistics officials, Centers requesting a waiver must provide compelling information explaining why they need to use an alternative inventory system to manage their flight inventory.

SMS Limitations on Managing Flight Inventory

Logistics officials from five of the six Centers not using SMS said the system does not meet their needs for accounting and tracking flight inventory.[21] For example, Goddard officials said SMS lacks a "kitting" functionality that would inform a user whether all the parts are available for a specified "kit."[22] Furthermore, SMS does not have the ability to charge programs and projects for inventory items purchased, a capability in Goddard's Center-specific inventory system. In addition, a Marshall official stated that SMS does not effectively track flight inventory with associated documentation such as flight tags, procurement records, certifications, and inspections, items they said are important when tracking inventory.

NASA Headquarters logistics management officials said they are aware of SMS's limited ability to maintain flight inventory information and acknowledged the system does not provide the "kitting" function or have the capability to retain certain documentation. To address these challenges, Headquarters logistics officials are meeting with Center logistics officials to discuss suggestions for modifying SMS. In addition, Headquarters' Logistics Management Division has developed a 5-year plan to modify SMS to meet the needs of the Centers and develop a standardized Agency cataloging process. In the interim, Centers will continue to use alternative inventory management systems until SMS is modified sufficiently to accommodate their needs.

[19] In July 2017, Headquarters' Logistics Management Division issued Goddard a waiver to use their inventory system while developing and implementing a transition plan to SMS.

[20] NPR 4100.1F.

[21] The sixth Center, JPL, is not required to use SMS; therefore, we did not solicit their comment on SMS use.

[22] Kitting is the gathering of components and parts needed for the manufacture of a particular assembly in which individual parts are gathered together as a "kit" and issued to the project. These kits are named and tracked within Goddard's stand-alone inventory system, the Advance Materials Management System, as well as in Marshall's stand-alone Flight Hardware Service Request System.

Limited Use of the Online Supply Catalog and Reservations System

Most Center logistics officials we surveyed were either unaware of OSCAR or chose not to use it as a procurement source for flight inventory. Specifically, officials from 9 of 10 Centers stated they do not use OSCAR to obtain flight inventory. According to NASA policy, Center supply support and material management programs should first look to maximize use of existing resources before procuring items from an outside vendor. OSCAR is intended to be used by program and project officials as a tool to research and reserve available flight inventory from their Center and other NASA locations before purchasing new items, which could potentially save money and prevent excess parts from taking storage space that would then require it to be inventoried.

Challenges with OSCAR

We identified three primary reasons Centers were not using OSCAR – lack of a standardized cataloging process, the ability to procure parts through other systems, and an incorrect assumption that OSCAR was only available to Centers using SMS.

NASA does not have a standardized cataloging process for entering flight inventory into SMS, a shortcoming that is subsequently reflected in OSCAR. As a result, items may be named or described differently or inconsistently in those systems, making it difficult for a Center to effectively use OSCAR to identify specific flight inventory available from other Centers. According to a Headquarters' Logistics Management Specialist, in January 2017 the Division formed a group composed of stakeholders from all Centers to create a standardized cataloging process to uniformly name, describe, identify, classify, and number flight inventory. Envisioned as a 5-year effort, officials plan to implement the standardized cataloging system NASA-wide.

Center logistics officials also explained that programs and projects rely on systems other than OSCAR to obtain flight inventory. For example, Marshall contacts the NASA Electrical, Electronic, and Electromechanical Parts Community of Practice, a group that uses the Electronic Parts Applications Reporting and Tracking System, to inquire about the availability of electrical parts from other Centers' flight inventory.[23] Glenn Research Center, in contrast, uses its own supply management system to procure flight inventory. While Center officials can use multiple systems to procure resources for their projects, OSCAR is intended to give project officials insights into flight inventory available at NASA before considering purchasing on the open market – an outcome that could enhance the Agency's efforts to effectively manage project costs and reduce the size of its spare parts inventory.

Finally, officials stated they assumed OSCAR was tied into SMS and therefore available only to Centers who use SMS. However, OSCAR is a web-based system available to NASA civil service employees and contractors. Headquarters officials agreed with our finding that since OSCAR's deployment in 2011

[23] In a March 2017 report, we found that NASA does not have a policy requiring Centers to use the Electronic Parts Applications Reporting and Tracking System and therefore not all Centers participated, reducing the effectiveness and utility of the system. NASA OIG, "NASA's Parts Quality Control Process" (IG-17-016, March 29, 2017).

logistics officials both at Headquarters and the Centers have failed to promote OSCAR and the opportunities it provides to procure existing flight inventory. In fact, OSCAR is cited in only one NASA policy document and that policy fails to explain its function.[24]

Center Physical Inventory Reviews of Flight Inventory are Incomplete

We found that Center logistics officials maintained and properly secured their flight inventory to protect them from theft and abuse at the four Centers we visited.[25] However, two of the four Centers – Goddard and Kennedy Space Center (Kennedy) – did not consistently conduct complete physical inventories of their program stock, which includes flight inventory, as required. According to NASA policy, Centers are required to conduct periodic physical inventories to assess the accuracy of their flight inventory records and, at least every 5 years, conduct a wall-to-wall inventory.[26]

Inventory Reviews at Goddard

As of May 2017, Goddard reported on-hand inventory for flight projects totaling more than $57 million. However, we found that Goddard only conducted sample reviews of its inventory and included only a small percentage of the Center's flight inventory in each review, claiming it is too labor intensive to conduct a full review. In addition, Goddard officials decided several years ago that the risk from not conducting a complete self-assessment was acceptable as long as the Center met sampling error rate thresholds.[27] However, a Headquarters logistics official pointed out that even if that sufficed for the required "periodic reviews," Goddard officials are not permitted to waive the requirement to conduct the every-5-year wall-to-wall inventory.

[24] NPR 4100.1F. In April 2017, while this audit was ongoing, the Headquarters' Logistics Management Division included an explanation of OSCAR in its quarterly newsletter.

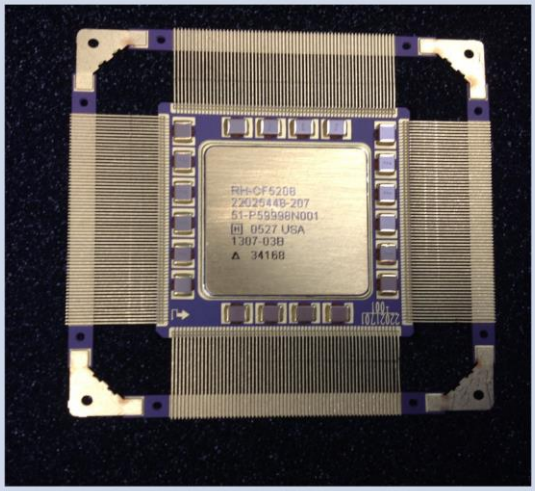
[25] We visited Goddard, JPL, Kennedy, and Marshall where inventory was maintained in locked facilities – warehouses, storerooms, and office buildings – managed by authorized personnel to limit access. In addition, environmentally sensitive equipment were maintained in climate-controlled facilities.

[26] NPR 4100.1F cancelled NPR 4100.1D, "NASA Materials Inventory Management Manual," July 29, 1999, which had the same 5-year requirement and allowed Centers to schedule the wall-to-wall inventory incrementally by status code, type account code, storage facility, or any other method that ensured every item is inventoried at least once every 5 years. NPR 4100.1F requires Centers to inventory 5 percent of their total items on hand every quarter for 5 years, equaling the same total inventory reviewed in a 5-year period.

[27] According to a Goddard official, as of July 2017 they are complying with NPR 4100.1F requirements for conducting inventory reviews.

To examine Goddard inventory control practices, we reviewed the inventory for a sample of 211 flight spare parts valued at more than $2.6 million from the Magnetospheric Multiscale Mission (MMS) launched in 2015.[28] Goddard logistics officials could not account for over $477,000 or approximately 18 percent of the sample flight inventory. In addition, we found the quantity of parts contained in packages did not consistently correspond to the number listed in the inventory database or on the packaging. For example, we counted four microcircuits in one package while the Center's inventory database listed one. Another package marked as containing 24 microcircuits only contained 11. Although logistics officials were able to resolve these relatively minor issues of mismatched package amounts before we concluded our visit, the discrepancies were indicative of an inventory control system needing improvement.

Spare Microprocessor from MMS



Source: NASA.

Goddard logistics officials could not account for missing MMS flight inventory during our initial visit and blamed the discrepancies on an antiquated inventory system that is no longer used for new inventory and did not provide real-time information when a flight inventory item was removed from a package. During a follow-up visit to Goddard, logistics officials located the missing MMS flight inventory in their supply warehouse. Center logistics officials noted that Goddard is transitioning its flight inventory to a more modern, stand-alone system that provides real-time inventory updates.

Inventory Reviews at Kennedy

Kennedy logistics officials reported in January 2017 approximately $16 million of flight inventory from the Restore-L Project, which the Center supported beginning in 2012.[29] However, a Project official told us they had not conducted a complete review of this inventory. Kennedy does not use SMS and Center officials told us they do not have another database to appropriately track and manage this flight inventory or document inventory review efforts. Additionally, because the Center does not use SMS, Kennedy logistics officials have limited awareness of this inventory and therefore could not provide oversight to manage it properly.

We found no discrepancies after reviewing a sample of 15 items in the Project's flight inventory valued at over $4.8 million. That said, we still believe Kennedy should conduct a complete review of its flight inventory in accordance with NASA policy. Kennedy logistics officials acknowledged their noncompliance with NASA policy and told us they are discussing the possibility of implementing SMS and migrating flight inventory data into that system.

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[28] In March 2015, NASA launched the Magnetospheric Multiscale Mission comprised of four satellites flying in formation in an elliptical orbit around Earth to investigate how the Sun's and Earth's magnetic fields connect and disconnect, which can affect telecommunications networks, Global Positioning System navigation, and electrical power grids.

[29] Kennedy also had other flight inventory worth over $253 million, including inventory from the Space Shuttle Program that is contractor managed. Restore-L is a technology demonstration satellite mission expected to launch in the mid-2020s capable of servicing other satellites in low Earth orbit. Restore-L did not become a mission until 2015; however, Kennedy began providing support to this Project through Goddard's Satellite Servicing Capabilities Office in 2012. The office was renamed the Satellite Servicing Projects Division in 2016.

CENTER SPARE PARTS DISPOSAL PRACTICES ARE INEFFICIENT AND UNTIMELY

Spare parts disposal practices need improvement at three of the four Centers examined in our review. Specifically, Goddard officials do not consistently make timely determinations as to whether flight spare parts should be retained or disposed. In addition, once inventory is identified for disposal, Kennedy and Marshall officials do not consistently provide pertinent information to inform prospective users and potential non-NASA buyers. Consequently, flight spare parts are sometimes unjustifiably retained years after projects end, adding to NASA's excess inventory and impeding the potential use of these flight spare parts for new, ongoing, or follow-on missions. Furthermore, not providing all applicable information for excessed flight spare parts could hinder NASA's efforts to obtain fair proceeds from selling these parts to outside entities.

Goddard Needs More Timely Decision-making Regarding Whether to Dispose of Spare Flight Inventory

Of the four Centers we visited, we found Goddard did not make timely determinations of whether some flight inventory from completed or launched projects should be retained or disposed. NASA policy requires Centers to continually review its assigned property, including flight spare parts, to identify items for disposal.[30] Disposing of unneeded inventory frees up resources required to store and track the materials. For example, according to a Goddard official, storage space for electronic spare parts in the Center's Electrostatic Discharge Lab is near capacity. This required two personnel, who normally perform other duties, to spend several days conducting inventories of spare parts primarily from the Hubble Space Telescope – a project that received its final on-orbit maintenance in May 2009.

A Goddard logistics official told us the Center had no formalized process for determining whether to retain or dispose of its flight inventory apart from providing project officials with monthly listings of their inventory. This official also stated that project managers are often slow to properly justify why they need to maintain inventory. Consequently, as of May 2017 Goddard reported it had $57 million worth of flight inventory program stock. Nearly $12 million, or 21 percent, of this inventory including microcircuits, connectors, capacitors, and transistors has been in storage from 1993 to 2010.[31]

NASA policy states that if a project intends to retain inventory, officials must provide appropriate justification based on current or potential future use.[32] Spare parts for projects subsequently cancelled should not be retained unless another project is identified that could use the items. If project officials identify inventory no longer needed, they should contact their Center PDO and provide details such as

[30] NPD 4100.1C.

[31] This amount is likely understated because Goddard logistics officials could not identify a dollar value for a small number of flight inventory items.

[32] NPR 4100.1F.

property condition and commercial description to enable potential use by other NASA Centers, transfer to other Federal agencies, or sale by GSA.[33]

During the course of our review, Goddard started using a new flight supply inventory form to determine whether spare parts should be retained or disposed. For each item, Project engineers determine whether to (1) retain in the appropriate laboratory, (2) box and move to long-term storage in the warehouse for potential future use, (3) designate parts to be made available to all projects on Center, or (4) excess designated parts. A decision to retain inventory must contain justification and the signature of a division chief or project manager. Goddard officials told us they plan to make additional improvements to its inventory assessment practices to ensure retention and disposal reviews are completed timely.

Insufficient Information Provided for Disposed Flight Inventory

NASA policy states that once a program or project identifies flight inventory for disposal, the Center PDO should add those items to NASA's online disposal system and include the following descriptors:[34]

- Program Source Code
- Hazards
- Condition
- Acquisition Cost
- Manufacturer
- Model/Serial Number
- Location
- Commercial Description
- Special Handling Instructions
- Export Control Requirements

The policy also states that projects should include excess inventory operating manuals, maintenance logs, or other instructional or informational publications on the item when reporting it to the Center PDO.

Of the four Centers we visited, we found that project officials at Kennedy and Marshall did not consistently provide required inventory information critical for making appropriate disposal decisions, neglecting to include certification, test, and quality assurance information related to the items' usability. For example, a fuel tank purchased for a Kennedy project went through a number of certifications including drawing compliance, material processing requirements, ultrasonic inspection, welding certification, and an external leakage test. However, Kennedy and Marshall officials indicated they do not consistently provide this certification information for disposed flight inventory.

[33] NPR 4300.1C.

[34] NPR 4300.1C.

Project officials and PDOs told us that in some cases flight inventory intended for disposal has hundreds of pages of certification information and therefore is too labor intensive to scan into the disposal database. In addition, a Marshall property official said it is a judgement call as to whether the certification will be provided with the inventory for disposal, stating that the decision is based on personal knowledge of the inventory and where it will be stored prior to sale or destruction of the property. For example, if an item needs storage in a controlled area and the Center does not have adequate space, the PDO will not provide the item's associated certification information because the integrity of the item could have been compromised by not being stored in the proper manner. This official also stated that providing certification information for flight inventory being sold or transferred depends on the relationship between prospective users and buyers because while the parts themselves may not be proprietary, the inventory certification may contain design information that could be.

In our judgement, PDOs should be provided all applicable documentation for disposed inventory so they may fulfill their responsibilities for internal screening, reporting, transfer, donation, sale, recycling, abandonment, and destruction of NASA-held property. Without full information, potential users may not be able to determine if the property meets their needs, affecting NASA's ability to use existing resources or sell them to an outside customer.

CONCLUSION

The availability of an adequate number of spare parts is essential for NASA projects and helpful for possible follow-on missions. NASA policies and procedures are designed to efficiently procure, effectively account for, and timely dispose of spare parts when no longer needed. We found the majority of NASA Centers do not use SMS (although required by NASA policy) to manage their flight inventory, which leaves NASA Headquarters with little insight into how much flight inventory, including spare parts, Centers are maintaining. Additionally, most Centers are not using the OSCAR system as a resource when considering whether existing flight inventory spare parts meet their requirements prior to purchasing new parts from outside vendors.

Furthermore, some Centers failed to conduct comprehensive internal reviews of their flight inventory as required. These shortcomings resulted from ineffective oversight and communication by Headquarters' Logistics Management Division, along with failures by Center personnel to follow Agency requirements. Effectively procuring, accounting for, and managing flight inventory, including spare parts, would save money by using existing resources and by providing project managers more accurate information to make prudent procurement decisions.

Likewise, logistics officials across the Agency should improve how they account for flight spare parts and other inventory. When Center officials do not respond timely to requests or fail to justify why flight inventory should be retained, NASA projects may retain inventory for years longer than required. Coupled with a failure to use SMS, this could lead to procurement of new inventory when usable flight spare parts are already available elsewhere at NASA. Using a formalized process for retaining and disposing of flight inventory as well as developing a standardized inventory form that captures information for Centers' flight inventory would improve the Agency's ability to maximize existing resources and reduce the size and cost of NASA inventory.

Lastly, procedures for disposing of unneeded flight spare parts varied widely at the four Centers we visited. Specifically, one Center retained parts much longer than needed while two other Centers excessed spare parts without the required certification information, operating manuals, maintenance record logs, or other information helpful to a potential NASA user or outside buyer. These conditions existed because policies and procedures, such as requesting waivers, completing mandatory inventory reviews, verifying the need to retain property, and providing required documentation for excessed property, have not been consistently followed by Center logistics personnel and Headquarters personnel provided ineffective oversight. Consequently, NASA could be missing savings by making uninformed procurement decisions based on inaccurate parts availability information and hindering efforts to obtain fair proceeds from selling excessed parts to outside entities.

RECOMMENDATIONS, MANAGEMENT'S RESPONSE, AND OUR EVALUATION

To increase accountability for and accuracy of NASA's flight spare parts inventory, we recommended the Assistant Administrator for Strategic Infrastructure:

1. Review each Center's SMS, stand-alone, and alternative inventory systems to reconcile differences and establish a methodology to ensure implementation of best practices and requirements regarding the procurement, use, storage, and disposal of flight spare parts.
2. Work with the Centers not using SMS to track flight inventory to either develop a transition plan to bring the Center into compliance or submit waivers explaining why they should not be required to use the system.
3. Develop a standardized cataloging process for OSCAR to ensure NASA program and project officials can effectively identify and reserve compatible flight inventory.
4. Develop outreach tools to promote the benefits of using OSCAR and encourage program and project managers to review the database before procuring flight inventory from outside vendors.
5. Work with Center logistics officials to develop alternative approaches to ensure Centers can meet the requirement to conduct complete reviews of spare parts inventories every 5 years.
6. Develop a standardized Agency-wide form that program and project officials would be required to use to identify parts for disposal or justify their retention.
7. Work with Center Property Disposal officials to develop procedures to ensure program and project officials provide all applicable documentation for disposed inventory.

We provided a draft of this report to NASA management, who concurred with each of the recommendations and described actions the Agency plans to take to address them. We consider management's comments responsive; therefore, the recommendations are resolved and will be closed upon verification and completion of the proposed actions.

Management's comments are reproduced in Appendix B. Technical comments provided by management have also been incorporated, as appropriate.

Major contributors to this report include Raymond Tolomeo, Science and Aeronautics Research Director; Adrian Dupree, Project Manager; Aleisha Fisher; Jobenia Parker; and Lauren Suls.

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

Paul K. Martin
Inspector General

APPENDIX A: SCOPE AND METHODOLOGY

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

This review assessed NASA's management of its flight spare parts inventory and its efforts to minimize costs and leverage resources. Specifically, we evaluated whether NASA (1) has an effective process for procuring inventory for its flight missions, (2) properly accounts for and safeguards its inventory, (3) effectively leverages existing spare parts inventory to address the needs of new and ongoing missions, and (4) effectively identifies and disposes of spare parts when deemed unusable or when they reach the end of their service life. We reviewed NASA's flight inventory management processes at Goddard Space Flight Center, the Jet Propulsion Laboratory, Kennedy Space Center, and Marshall Space Flight Center.

To accomplish this review, we spoke with logistics, program, and project managers and staff from these four Centers to gain an understanding of their processes, controls, and systems for managing their flight inventory, including spare parts. We also assessed these Centers' controls for physically securing its flight inventory. Additionally, we conducted a survey of officials from the Centers that we did not visit. We surveyed Ames Research Center, Armstrong Flight Research Center, Glenn Research Center, Johnson Space Center, Langley Research Center, and Stennis Space Center regarding use of NASA's Supply Management System and Online Supply Catalog and Reservations system. Furthermore, we interviewed officials from NASA Headquarters' Logistics Management Division to understand the systems used to account for, track, and retrieve flight inventory, and to gain an understanding of NASA's policies and procedures for Centers managing its flight inventory including spare parts.

To better understand how NASA has employed its policies and procedures within the context of managing its flight spare parts inventory we selected several science projects across different NASA Centers. We obtained spare part documentation for launched and completed projects, an active project with flight spare parts inventory, and legacy projects such as the Orbiting Carbon Observatory and the Mars Science Laboratory Curiosity rover mission. From this documentation, we selected flight inventory with $10,000 or more unit cost and used a random list generator to comprise our inventory review list. We discussed the results of our review with appropriate NASA Center management.

We obtained and examined internal and external applicable documents related to inventory management as well as NASA policy. The documents we examined included the following:

- NASA Federal Acquisition Regulation Supplement Part 1845, "Government Property," March 15, 2016
- NPD 1000.5B, "Policy for NASA Acquisition," December 19, 2013
- NPR 1400.1G, "NASA Directives and Charters Procedural Requirements w/Change 2," July 10, 2015
- NPR 4100.1D, "NASA Materials Inventory Management Manual," July 29, 1999

- NPR 4100.1F, "NASA Supply Support and Material Management Procedural Requirements," March 7, 2017
- NPD 4200.1C, "Equipment Management," July 31, 2013
- NPR 4500.1, "Administration of Property in the Custody of Contractors," February 24, 2014
- NPR 4300.1C, "NASA Personal Property Disposal Procedural Requirements," June 27, 2013
- NPR 7120.5E, "NASA Space Flight Program and Project Management Requirements w/Changes 1-15," August 14, 2012
- NPD 7500.1D, "Program and Project Life-Cycle Logistics Support Policy," March 2, 2015

Use of Computer-Processed Data

We used computer-processed data to perform this audit. Specifically, flight inventory data was provided by respective NASA Center program and project officials as well as NASA Headquarters and Center logistics managers. Headquarters and Center logistics officials have inconsistent understandings regarding Center use of SMS to account for and track flight inventory. Some Centers we surveyed and interviewed indicated they do not use SMS to manage their flight inventory. However, according to a Headquarters logistics official and a Headquarters-produced SMS report, these Centers use SMS to manage their flight inventory in some capacity. Accordingly, we question the accuracy of the information reported in SMS and do not believe it accurately depicts what flight inventory is currently maintained by or potentially available for use between the Centers.

Review of Internal Controls

We reviewed, tested, and evaluated internal controls related to NASA's management of its spare parts inventory. This included assessing compliance with requirements such as applicable Federal laws, regulations, directives, and NASA policies and procedures. The control weaknesses we identified were previously discussed in this report. Our recommendations, if implemented, should correct the identified weaknesses.

Prior Coverage

During the last 5 years, the NASA Office of Inspector General (OIG), Department of Defense OIG, and Department of Energy OIG issued three reports of significant relevance to the subject of this report. Unrestricted reports can be accessed at https://oig.nasa.gov/audits/reports/FY18/index.html, http://www.dodig.mil, and http://energy.gov/ig/office-inspector-general, respectively.

NASA Office of Inspector General

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

Department of Defense Office of Inspector General

Summary of DoD Office of Inspector General Spare-Parts Inventory Audits: Additional Guidance is Needed (DODIG-2015-104, March 31, 2015)

Department of Energy Office of Inspector General

The Department of Energy's Management of Spare Parts at Selected Sites (DOE/IG-0936, May 21, 2015)

APPENDIX B: MANAGEMENT'S COMMENTS

National Aeronautics and Space Administration
Headquarters
Washington, DC 20546-0001

OCT - 3 2017

Reply to Attn of: Office of Strategic Infrastructure

TO: Assistant Inspector General for Audits

FROM: Assistant Administrator for Strategic Infrastructure

SUBJECT: Agency Response to OIG Draft Report, "NASA's Management of Spare Parts for its Flight Projects" (A-16-017-00)

NASA appreciates the opportunity to review and comment on the Office of Inspector General (OIG) draft report entitled, "NASA's Management of Spare Parts for its Flight Projects" (A-16-017-00), dated September 14, 2017.

In the draft report, the OIG makes seven recommendations addressed to the Assistant Administrator for Strategic Infrastructure (AA/OSI) intended to increase accountability for and accuracy of NASA's flight spare parts inventory.

Specifically, the OIG recommends the AA/OSI:

Recommendation 1: Review each Center's Supply Management System (SMS), stand-alone, and alternative inventory systems to reconcile differences and establish a methodology to ensure implementation of best practices and requirements regarding the procurement, use, storage, and disposal of flight spare parts.

Management's Response: Concur. OSI will collaborate with Centers to review stand-alone system capabilities and identify SMS capability gaps and establish a methodology to ensure best practices and requirements are incorporated into SMS.

Estimated Completion Date: December 31, 2018.

Recommendation 2: Work with the Centers not using SMS to track flight inventory to either develop a transition plan to bring the Center into compliance or submit waivers explaining why they should not be required to use the system.

Management's Response: Concur. OSI will direct Centers not using SMS to track flight inventory to develop a transition plan to bring the Centers into compliance and require the Center to submit a waiver not to exceed the transition period agreed to by the Logistic Management Division.

Estimated Completion Date: March 31, 2018.

Recommendation 3: Develop a standardized cataloging process for the Online Supply Catalog and Reservations (OSCAR) system to ensure NASA program and project officials can effectively identify and reserve compatible flight inventory.

Management's Response: Concur. OSI will continue implementing across all logistics systems the 5-year Cataloging Implementation Plan formulated in February 2017 and approved by Agency stakeholders.

Estimated Completion Date: December 31, 2021.

Recommendation 4: Develop outreach tools to promote the benefits of using OSCAR and encourage program and project managers to review the database before procuring flight inventory from outside vendors.

Management's Response: Concur. OSI in collaboration with the Center logistics community will develop outreach and marketing tools to promote and encourage customers to use OSCAR before procuring flight inventory.

Estimated Completion Date: September 30, 2018.

Recommendation 5: Work with Center logistics officials to develop alternative approaches to ensure Centers can meet the requirement to conduct complete reviews of spare parts inventories every 5 years.

Management's Response: Concur. OSI has put controls in place to ensure Centers are performing physical inventories of 100 percent of their spare parts every five years. NASA Procedural Requirements (NPR) 4100.1F, NASA Supply Support and Material Management, revised in February 2017, requires Centers to conduct a cyclical inventory of five percent of the total line items on hand every quarter for a total of 20 percent each fiscal year ensuring all assets have been inventoried at the end of the fifth year. OSI will monitor Centers' inventory quarterly reports to ensure compliance.

Estimated Completion Date: September 30, 2021.

Recommendation 6: Develop a standardized Agency-wide form that program and project officials would be required to use to identify parts for disposal or justify their retention.

Management's Response: Concur. OSI will develop a standardized Agency-wide process to document justification for inventory retention.

Estimated Completion Date: March 31, 2018.

Recommendation 7: Work with Center Property Disposal officials to develop procedures to ensure program and project officials provide all applicable documentation for disposed inventory.

Management's Response: Concur. OSI will work with the Centers to develop necessary policy and ensure that appropriate documentation accompanies property entering the disposition process.

Estimated Completion Date: March 31, 2018.

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

Once again, thank you for the opportunity to review and comment on the subject draft report. If you have any questions or require additional information regarding this response, please contact Fatima Johnson on (202) 358-1631.

Calvin F. Williams

APPENDIX C: REPORT DISTRIBUTION

National Aeronautics and Space Administration

Acting Administrator
Acting Deputy Administrator
Acting Associate Administrator for Mission Support
Assistant Administrator for Strategic Infrastructure
Director, Ames Research Center
Director, Armstrong Flight Research Center
Director, Glenn Research Center
Director, Goddard Space Flight Center
Director, Jet Propulsion Laboratory
Director, Johnson Space Center
Director, Kennedy Space Center
Director, Langley Research Center
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Non-NASA Organizations and Individuals

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

Government Accountability Office
    Director, Office of Acquisition and Sourcing Management

Congressional Committees and Subcommittees, Chairman and Ranking Member

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

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

Senate Committee on Homeland Security and Governmental Affairs

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

House Committee on Oversight and Government Reform
    Subcommittee on Government Operations

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

(Assignment No. A-16-017-00)