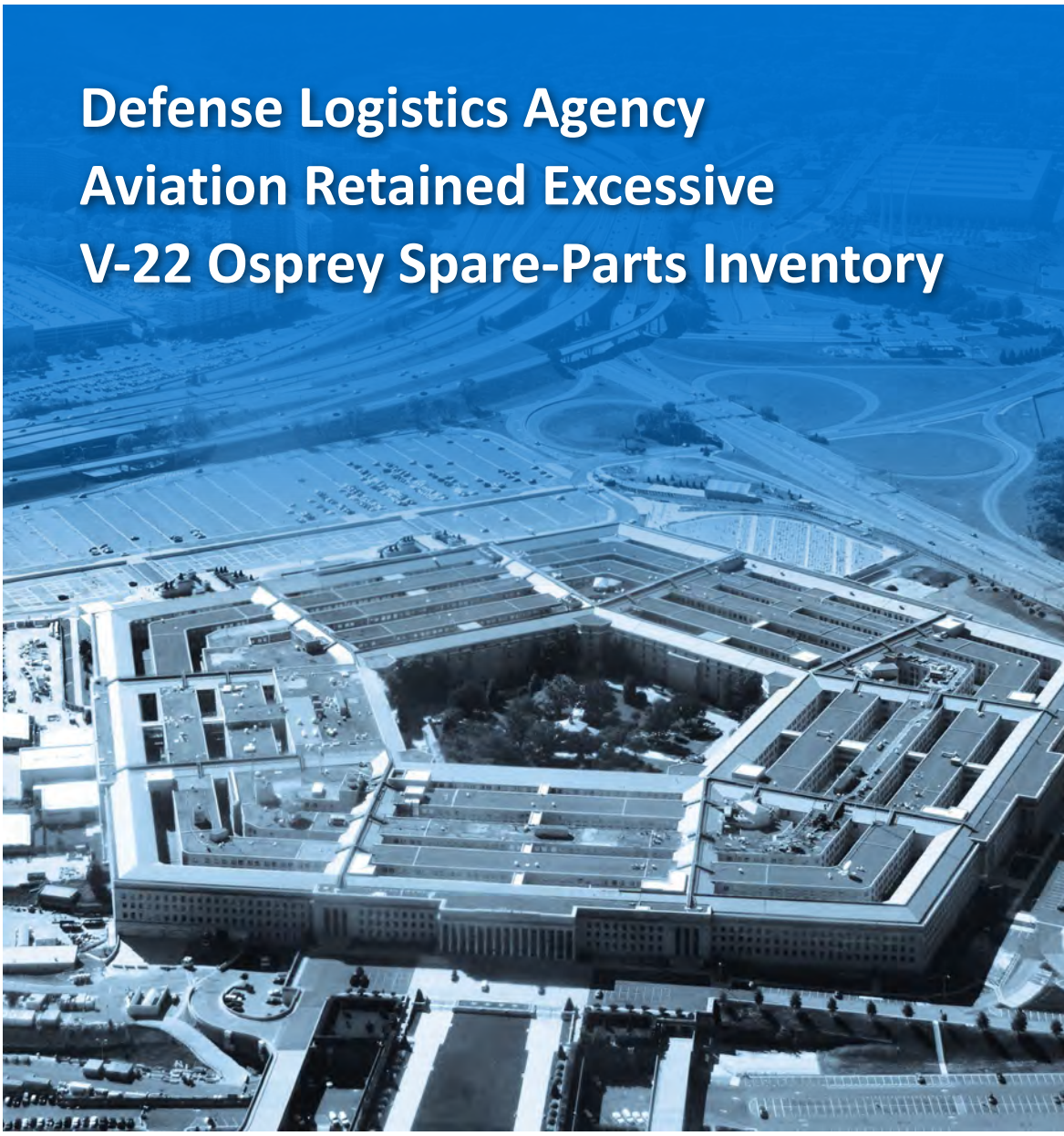
Report No. DODIG-2015-136

INSPECTOR GENERAL

U.S. Department of Defense

JUNE 24, 2015

Defense Logistics Agency Aviation Retained Excessive V-22 Osprey Spare-Parts Inventory



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Results in Brief

Defense Logistics Agency Aviation Retained Excessive V-22 Osprey Spare-Parts Inventory

June 24, 2015

Objective

The objective of the audit was to determine whether DoD effectively managed Government-owned V-22 spare parts before procuring the same parts from private contractors and whether DoD properly accounted for Government-owned V-22 inventory managed by private contractors.

Finding

The Defense Logistics Agency (DLA) Aviation did not effectively manage Government-owned V-22 Osprey spare parts. For 22 of 53 spare parts that we nonstatistically selected for review, DLA Aviation retained spare-parts inventory that was excessive.

This occurred because DLA Aviation:

- did not evaluate the reasonableness of V-22 Osprey spare-parts inventory quantities, and
- forecasted and purchased excessive inventory of V-22 Osprey spare parts.

As a result, DLA Aviation retained excessive inventory valued at $8.7 million. In addition, it will cost DLA Aviation approximately $0.7 million in holding costs over the next 5 years to store and retain the excessive inventory.

Recommendations

We recommend that the Director, DLA:

- evaluate the reasonableness of V-22 Osprey spare-parts inventory quantities to ensure they do not retain or procure excessive inventory;
- review inventory identified as economic retention stock and contingency retention stock and determine whether it was properly categorized. In addition, document its retention and approval decisions, if applicable; re-categorize the inventory, as appropriate; and initiate the review and disposal process for V-22 Osprey spare parts categorized as potential reutilization stock; and
- establish a plan for conducting periodic reviews of forecasting results to ensure DLA Aviation officials do not purchase excessive V-22 Osprey spare-parts inventory.

Management Comments and Our Response

The Executive Director, Support, DLA Logistics Operations, responding for the Director, DLA, partially addressed the recommendations in the draft report. We request that the Director provide comments on the final report. Please see the Recommendations Table on the next page.

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Recommendations Table

Management	Recommendations Requiring Comment
Director, Defense Logistics Agency	1.a, 1.b, and 1.c

Please provide Management Comments by July 23, 2015.

INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
4800 MARK CENTER DRIVE
ALEXANDRIA, VIRGINIA 22350-1500

June 24, 2015

MEMORANDUM FOR DIRECTOR, DEFENSE LOGISTICS AGENCY

SUBJECT: Defense Logistics Agency Aviation Retained Excessive V-22 Osprey Spare-Parts Inventory (Report No. DODIG-2015-136)

We are providing this report for your review and comment. The Defense Logistics Agency Aviation did not effectively manage Government-owned V-22 Osprey spare parts. As a result, it retained excessive inventory valued at $8.7 million and will incur approximately $0.7 million in holding costs over the next 5 years to store and retain the excessive inventory. We conducted this audit in accordance with generally accepted government auditing standards.

DoD Instruction 7650.03 requires that all recommendations be resolved promptly. We considered comments on a draft of this report when preparing the final report. Comments from the Executive Director, Support, DLA Logistics Operations, responding for the Director, DLA, partially addressed the recommendations. Therefore, we request that the Director, DLA, comment on Recommendations 1.a, 1.b, and 1.c by July 23, 2015.

Please send a PDF file containing your comments to audapi@dodig.mil. Copies of your comments must have the actual signature of the authorizing official for your organization. We cannot accept the /Signed/ symbol in place of the actual signature. If you arrange to send classified comments electronically, you must send them over the SECRECT Internet Protocol Router Network (SIPRNET).

We appreciate the courtesies extended to the staff. Please direct questions to me at (703) 604-9077.

Jacqueline L. Wicecarver
Assistant Inspector General
Acquisition, Parts, and Inventory

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INSPECTOR GENERAL
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Introduction

Objective

Our objective was to determine whether the DoD effectively managed Government-owned V-22 spare parts before procuring the same parts from private contractors. See Appendix A for a discussion of the scope and methodology and Appendix C for prior audit coverage related to the objective.

Background

V-22 Osprey

The V-22 Osprey is an aircraft that takes off and lands like a helicopter and flies like a plane by tilting its rotors to function as propellers. According to the Boeing Company (Boeing), the V-22 Osprey:

- combines the capabilities of a helicopter with the speed and range of a fixed-wing aircraft;
- has a range of over 2,100 nautical miles on a single refueling; and
- provides the Military Services with a vertical take-off and landing capability that can quickly deploy anywhere in the world.

According to Bell Helicopter Textron Inc. (Bell), the V-22 Osprey carries 24 combat troops, up to 20,000 pounds of internal cargo, or 15,000 pounds of external cargo. Figures 1 and 2 show the V-22 Osprey in fixed- and rotor-wing configurations.

Figure 1. Fixed-Wing Configuration
Source: www.marines.com/photos/

Figure 2. Rotor-Wing Configuration
Source: www.af.mil/News/Photos.aspx

The U.S. Marine Corps, U.S. Navy, U.S. Air Force and U.S. Special Operations Command use different variations of the V-22 Osprey. Specifically, the Marine Corps and the Navy use the MV-22 variant to meet their amphibious, vertical assault, and strike rescue needs. The Air Force and U.S. Special Operations Command use the CV-22 variant for special operations.

Defense Logistics Agency

According to the Defense Logistics Agency (DLA), headquartered in Fort Belvoir, Virginia, it provides the Military Services, Federal agencies, and U.S. allies with logistic, acquisition, and technical services. DLA is responsible for nearly all consumable and spare parts required by the Military Services.

DLA Aviation, headquartered in Richmond, Virginia, supports and manages more than 1,800 major weapons systems and 1.1 million spare parts for all fixed- and rotor-wing aircraft, including the V-22 Osprey. As of February 2015, DLA Aviation managed more than 41,000 unique V-22 Osprey spare parts, valued at approximately $539 million. DLA Aviation also manages fighter, bomber, transport and helicopter engine spare parts, airframe and landing gear spare parts, flight safety equipment, and propeller systems.

Naval Supply Systems Command Weapon Systems Support

The Naval Supply Systems Command (NAVSUP) Weapon Systems Support (WSS), located in Philadelphia, Pennsylvania, provides the Military Services and U.S. allies with program and supply support for weapon systems, such as the V-22 Osprey, and keeps the Navy mission ready. NAVSUP WSS manages consumable[1] V-22 Osprey spare parts; however, in May 2010 it began to transfer management responsibility for these parts to DLA Aviation. NAVSUP WSS transferred the majority of its V-22 Osprey consumable spare-parts inventory to DLA Aviation by 2012. As of February 2015, NAVSUP WSS continues to transfer V-22 Osprey spare parts to DLA Aviation.

Bell Helicopter Textron and the Boeing Company

According to Boeing, it partnered with Bell to manufacture the V-22 Osprey. Bell and Boeing maintain the Bell-Boeing Joint Project Office, headquartered in California, Maryland. Each contractor manufactures different parts of the V-22 Osprey. Specifically, Bell is responsible for the wings, transmissions, rotor systems, engine installation, and final assembly. Boeing is responsible for the fuselage, tail assembly, electrical systems, flight control systems, and all subsystems.

[1] Consumable parts are normally expended or used beyond recovery during use.

In September 2005, the Office of the Under Secretary of Defense (Acquisition, Technology, and Logistics) approved the V-22 Osprey program for final production.[2] As of February 2015, Bell and Boeing delivered 294 V-22 Ospreys, at a cost of approximately $83.9 million per aircraft, to the Military Services. Bell and Boeing are scheduled to produce an additional 118 V-22 Ospreys by December 2019.

Review of Internal Controls

DoD Instruction 5010.40, "Managers' Internal Control Program Procedures," May 30, 2013, requires DoD organizations to implement a comprehensive system of internal controls that provides reasonable assurance that programs are operating as intended and to evaluate the effectiveness of the controls. We identified an internal control weakness associated with the inventory management for the V-22 Osprey spare parts. Specifically, DLA Aviation's process to manage V-22 Osprey spare parts was not effective because 22 of 53 spare parts that we nonstatistically selected for review had inventory quantities that were excessive. We will provide a copy of the report to the senior official responsible for internal controls in the Defense Logistics Agency.

[2] Final production is commonly referred to as full-rate production, which occurs when the entire procurement quantity is approved for production and delivery to the end user.

Finding

Management of V-22 Osprey Spare Parts Needs Improvement

The Defense Logistics Agency (DLA) Aviation did not effectively manage Government-owned V-22 Osprey spare parts. For 22 of 53 V-22 Osprey spare parts that we nonstatistically selected for review, DLA Aviation retained spare-parts inventory that was excessive.[3] This occurred because DLA Aviation did not evaluate the reasonableness of V-22 Osprey spare-parts inventory quantities. Further, DLA Aviation forecasted and purchased excessive inventory of V-22 Osprey spare parts. As a result, DLA Aviation retained excessive inventory valued at $8.7 million. DLA Aviation will incur approximately $0.7 million in holding costs over the next 5 years to store and retain the excessive inventory.

DLA Aviation Retained Excessive V-22 Osprey Inventory

DLA Aviation's process to manage V-22 Osprey spare parts was not effective because it resulted in as much as 79 years of excessive inventory.

DLA Aviation Inventory Retention

To minimize the quantity of spare parts ordered and stored, DoD guidance[4] requires DoD Components to balance costs with demand. Therefore, DLA Aviation is required to purchase spare parts in quantities that minimize the total cost of ordering and holding the spare parts in inventory.

This DoD guidance also requires DoD Components to properly categorize their spare part inventories into the following groups:

- Approved Acquisition Objective (AAO). The quantity of a spare part authorized to equip and support U.S. and Allied Forces.
- Economic Retention Stock (ERS). The quantity of a spare part that costs less to retain than to dispose.
- Contingency Retention Stock (CRS). The quantity of a spare part retained for possible future events, such as disaster relief.

[3] We calculated excessive inventory as the quantity of parts that exceeded the requirement objective plus 2 years future demand. The requirements objective establishes the quantity of parts needed to replenish an item's stock. It includes quantities for low, infrequent, or highly variable demand; quantities for fluctuations in demand and interruptions in the supply process; backorders; administrative and production lead times; and economic order quantities. To calculate 2 years future demand, we averaged the last 5 years historical demand data and multiplied the average by two.

[4] DoD Regulation 4140.1-R, "DoD Supply Chain Materiel Management Regulation," May 23, 2003, and DoD Manual 4140.01, Volume 2, "DoD Supply Chain Materiel Management Procedures: Demand and Supply Planning," February 10, 2014.

- Potential Reutilization Stock (PRS). The quantity that exceeds the sum of the AAO, ERS, and CRS and is potentially excess to a DoD Component's requirements.

Therefore, DLA Aviation may retain quantities of spare parts that are categorized as AAO, ERS, and CRS. In accordance with DoD Guidance,[5] DLA Aviation must review spare-part quantities categorized as PRS for transfer to the DLA Disposition Services for disposal. DoD guidance does not clearly specify how DoD Components should calculate their AAO, ERS, CRS, and PRS spare-part quantities. Therefore, DLA Aviation used its own process to determine the quantities of V-22 Osprey spare parts to categorize as AAO, ERS, CRS, and PRS. Specifically, DLA Aviation used an automated computer program to calculate AAO, ERS, CRS, and PRS. DLA Aviation's process to calculate the quantity of V-22 Osprey spare parts to purchase and retain was consistent with DoD guidance.

We developed a methodology to determine the reasonableness of the V-22 Osprey spare-part inventory quantities. We determined that a reasonable inventory quantity for V-22 Osprey spare parts was DLA Aviation's requirements objective plus an additional 2 years of future demand. This allowed DLA Aviation sufficient quantities to meet current and future demand while it retained additional inventory to meet unexpected needs, such as a change in demand. Therefore, we determined that quantities of parts that exceeded the requirements objective plus an additional 2 years of future demand were excessive inventory.

Twenty-Two V-22 Osprey Spare Parts Reviewed Had Excessive Inventory

Of the 53 V-22 Osprey spare parts reviewed, 22 had inventory quantities that were excessive to the requirements objective and an additional 2 years of future demand. For example, 4 parts had 15 or more years of excessive inventory. See Table 1 for the years of excessive inventory for 22 parts. See Appendix D for a detailed list of the total years of inventory DLA Aviation retained for each part and how many years were excessive.

[5] DoD Manual 4140.01, Volume 6, "DoD Supply Chain Materiel Management Procedures: Materiel Returns, Retention, and Disposition," February 10, 2014.

Table 1. Excessive Inventory for 22 V-22 Osprey Spare Parts

Years of Excessive Inventory	Quantity of Spare Parts with Excessive Inventory
0.1-5	8
5-15	7
15-25	2
25-50	0
50-80	2
No Demand	3*
Total	**22**

* Three V-22 Osprey spare parts had no estimated future demand; therefore, we could not calculate the years of excessive inventory. We identified the entire inventory as excessive.

Examples of Excessive V-22 Osprey Spare Parts

Figure 3. Intercom Station Controls.
Source: DLA Distribution Cherry Point, NC

DLA Aviation's V-22 Osprey spare-parts inventory included excessive quantities of on-hand and due-in spare parts. For example, DLA Aviation retained excessive inventory of aircraft frames. Based on our methodology to calculate the reasonableness of the V-22 Osprey spare-part inventory quantities, 158 of 166 aircraft frames were excessive inventory. DLA Aviation retained 79 years of excessive inventory of aircraft frames, valued at $249,499. In another example, DLA Aviation maintained $1.46 million in excessive inventory of intercom station controls. See Table 2 for a summary of these examples.

DLA Aviation retained 79 years of excessive inventory of aircraft frames, valued at $249,499.

Table 2. Summary of Excessive Inventory for 2 of 22 V-22 Osprey Spare Parts

Description of Parts	Quantity of Parts in Inventory	Quantity of Parts that were Excessive Inventory	Years of Excessive Inventory	Value of Excessive Inventory
Aircraft frames	166	158	79.0	$249,499
Intercom station controls	236	179	9.0	1,463,191

DLA Aviation Officials Did Not Evaluate V-22 Osprey Spare Parts for Reasonableness

DLA Aviation reviewed V-22 Osprey spare-parts inventory quantities and categorized the quantities as AAO, ERS, CRS, and PRS, as required by DoD guidance.[6] However, DLA Aviation did not evaluate the reasonableness of spare-parts inventory quantities. As previously discussed, we determined that a reasonable inventory quantity was DLA Aviation's requirements objective plus an additional 2 years of future demand and quantities exceeding that amount were excessive inventory.

DoD guidance[7] requires DoD Components to categorize their inventory and implement procedures to make proper retention and disposal decisions. According to DoD guidance,[8] categorizing inventory is intended to provide visibility of DoD requirements, on-hand and on-order assets, demand, and overages or shortfalls. Assessing the reasonableness of its spare-parts inventory quantities is necessary to ensure DLA Aviation does not retain or procure too much inventory.

For example, DLA Aviation retained 18 aircraft chassis assemblies, evaluated the inventory quantities, and categorized all 18 parts as AAO. However, the annual average demand for this part was one and the requirements objective, which considers fluctuations in demand, interruptions in supply, lead times, backorders, and economic order quantities, was 2. Therefore, it will take DLA Aviation approximately 18 years to use all of the parts in inventory. We determined that approximately 4 years of inventory was reasonable for this part and DLA Aviation retained 14 years of excessive inventory, valued at $286,629.

Similarly, DLA Aviation retained 49 particle separators and categorized all 49 parts as AAO. The annual average demand for this part was five and the requirements objective was four. As a result, it will take DLA Aviation approximately 10 years to use 49 parts. We determined that approximately 3 years of inventory was reasonable for this part and DLA Aviation retained 7 years of excessive inventory, valued at $221,550. Therefore, although DLA Aviation officials reviewed the spare-part inventory quantities and categorized the quantities as AAO, they should also review the reasonableness of the results to ensure they do not retain or procure too much inventory.

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[6] DoD Manual 4140.01, Volume 1, "DoD Supply Chain Materiel Management Procedures: Operational Requirements," February 10, 2014.

[7] DoD Manual 4140.01, Volume 6, "DoD Supply Chain Materiel Management Procedures: Materiel Returns, Retention, and Disposition," February 10, 2014.

[8] DoD Manual 4140.01, Volume 10, "DoD Supply Chain Materiel Management Procedures: Metrics and Inventory Stratification Reporting," February 10, 2014.

DoD guidance[9] allows managers to retain inventory categorized as AAO, ERS, and CRS; however, the guidance does not require managers to retain inventory up to these levels. As previously discussed, DLA Aviation used its process to categorize parts as AAO, ERS, CRS, and PRS quantities and DLA Aviation established its own AAO levels. For example, DLA Aviation established the AAO for another aircraft frame as 164; accordingly, DLA Aviation ordered 164 parts. However, the annual average demand was two parts and the requirements objective was three parts. As a result, it will take DLA Aviation approximately 81 years to use 164 aircraft frames. Therefore, although DLA Aviation could retain up to 164 parts, it may not be reasonable to do so.

Additionally, DoD guidance[10] states that only minimal inventory should be retained for nonforecastable parts that are required occasionally or intermittently. According to DoD guidance,[11] a nonforecastable part has limited demand, highly-variable demand quantities, or highly-intermittent demand frequency. Thirteen of the 22 V-22 Osprey spare parts with excessive inventory were nonforecastable parts. For instance, DLA Aviation set the AAO for a nonforecastable aircraft door assembly as 21 parts and retained 21 parts in inventory. However, the annual average demand was 1 part and the requirements objective was zero parts. Because this part was nonforecastable, DLA Aviation was required to retain only a minimal quantity of parts. Therefore, although DLA Aviation was authorized to retain up to 21 parts, that quantity may not have been reasonable because it will take DLA Aviation approximately 21 years to use 21 aircraft frames.

The Director, DLA, should evaluate the reasonableness of V-22 Osprey spare-parts inventory quantities to ensure they do not retain or procure excessive inventory.

DoD guidance[12] requires DoD Components to justify their rationale for categorizing inventory as ERS if the demand is not predictable. In addition, the guidance requires DoD Components to provide a rationale for categorizing inventory as CRS and document CRS retention decisions and senior management approval of retention decisions. Furthermore, according to DoD guidance, DoD Components

[9] DoD Manual 4140.01, Volume 6, "DoD Supply Chain Materiel Management Procedures: Materiel Returns, Retention, and Disposition," February 10, 2014.

[10] DoD Manual 4100.39, Volume 10, "Federal Logistics Information System Procedures Manual," October 2010.

[11] DoD Manual 4140.01, Volume 2, "DoD Supply Chain Materiel Management Procedures: Demand and Supply Planning," February 10, 2014.

[12] DoD Manual 4140.01, Volume 6, "DoD Supply Chain Materiel Management Procedures: Materiel Returns, Retention, and Disposition," February 10, 2014.

should review PRS inventory for transfer to DLA Disposition Services for disposal. DLA Aviation identified 2 of 22 parts as having ERS, CRS, and PRS. Specifically, DLA Aviation identified air XMSN housing parts and wiring harnesses in the following categories.

- 6 nonforecastable, air XMSN housing parts, valued at $53,054, as ERS. However, DLA Aviation did not document the decision to retain the parts as ERS, as required.
- 3 wiring harnesses, valued at $45,049, as CRS. DoD guidance also requires DoD Components to document CRS retention decisions and record senior management approval of CRS retention decisions. However, DLA Aviation did not document the retention decision or senior management approval to retain the parts as CRS.
- 14 wiring harnesses, valued at $210,229, as PRS. DoD guidance[13] identifies PRS as excess inventory that should be reviewed for transfer to the DLA Disposition Services for disposal within 3 months of being categorized as PRS. In addition, the guidance requires managers to document its disposition decisions and actions. DLA Aviation did not review the parts for transfer to DLA Disposition Services for disposal within the 3-month requirement.

According to DLA Aviation officials, they did not document ERS, CRS, or PRS decisions for every part. Instead, DLA Aviation officials determined that senior management approved the use of the system that identifies stock as ERS, CRS, and PRS; therefore, any results that the system generated were considered to be approved by management. According to DLA Aviation officials, inventory was categorized as PRS in October 2014, and DLA Aviation did not have the opportunity to act on the PRS yet.

The Director, DLA, should review inventory identified as ERS and CRS and determine whether it was properly categorized. In addition, document its retention and approval decisions, if applicable; re-categorize the inventory, as appropriate; and initiate the review and disposal process for V-22 Osprey spare parts categorized as potential reutilization stock.

[13] DoD Manual 4140.01, Volume 6, "DoD Supply Chain Materiel Management Procedures: Materiel Returns, Retention, and Disposition," February 10, 2014, and DoD "Comprehensive Inventory Management Improvement Plan," October 2010.

Forecasted Excessive Inventory

DLA Aviation purchased excessive inventory for 8 of 22 parts. According to DLA Aviation officials, their demand and supply planning system (system) automatically identified spare parts as either forecastable or nonforecastable,[14] based on the availability of historical demand.

- For parts with adequate historical demand, DLA Aviation's system automatically selected one of seven computer-generated algorithms[15] to statistically calculate demand and determine the quantity of parts to purchase.
- For parts with limited historical demand, DLA Aviation's system established minimum and maximum quantities to determine the quantity of parts to purchase. Specifically, DLA Aviation's system used three inventory management techniques for parts with limited historical demand:
    - Stock Keeping Unit (SKU) Build was used for parts with inadequate demand history;
    - Peak was used for parts with low or infrequent demand; and
    - Next-Gen was used for parts with highly variable demand.

According to DLA Aviation officials, their system automatically selected the best technique to identify a part's demand. DLA Aviation used the following techniques to purchase 8 parts with excessive inventory:

- 4 forecastable parts used statistical inventory management techniques,[16] and
- 4 nonforecastable parts used SKU Build.

DLA Aviation purchased excessive inventory for 8 parts using several inventory management techniques. Therefore, Director, DLA, should establish a plan for conducting periodic reviews of the forecasting results to ensure officials do not purchase excessive V-22 Osprey spare-parts inventory.

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[14] A part is forecastable if there is adequate historical demand to statistically calculate future demand. A part is nonforecastable if there is limited historical demand and nonstatistical techniques are used to estimate future demand.

[15] DLA Aviation's statistical forecasting techniques include: Croston, Adaptive Variable Smoothing Graves, Lewandowski, Holt-Winters, Moving Average, Multiple Linear Regression, and Fourier.

[16] DLA Aviation used four statistical forecasting techniques for these parts: Lewandowski, Croston, Holt-Winters, and Fourier.

DLA Aviation Retained Excessive V-22 Osprey Spare-Parts Inventory

DLA Aviation's process to manage V-22 Osprey spare parts resulted in excessive inventory for 22 spare parts, valued at approximately $8.7 million. In addition, DLA Aviation could incur holding costs[17] for the excessive inventory placed in storage. DoD Components are required to consider holding costs when balancing their costs with demand to minimize their inventory. If DLA Aviation continues to retain excessive inventory quantities for 22 V-22 Osprey spare parts, it could incur approximately $0.7 million in holding costs over the next 5 years. DLA Aviation could put the $0.7 million in holding costs to better use. See Table 3 for the quantities of V-22 Osprey spare parts with $8.7 million in excessive inventory and $0.7 million in holding costs over the next 5 years.

DLA Aviation could put the $0.7 million in holding costs to better use.

Table 3. Values of Excessive Inventory and Holding Costs

Years of Excessive Inventory	Quantity of Spare Parts With Excessive Inventory	Value of Excessive Inventory*	Holding Costs for the Next 5 Years*
0.1-5	8	$2,309,138	$112,950
5-15	7	4,087,359	289,277
15-25	2	670,954	87,401
25-50	0	–	–
50-80	2	503,817	53,367
No Demand	3	1,166,138	170,479
Total	**22**	**$8,737,405**	**$713,473**

* Minor inconsistencies in the totals may occur due to rounding.

[17] Holding costs represent the expenses DoD Components incur for retaining inventory for future use.

Other Matter of Interest on Obsolete Parts Not Used Before Replacement Parts Were Purchased

DLA Aviation retained spare parts in inventory that were obsolete and identified as "use until stock is exhausted." Obsolete parts identified as "use until stock is exhausted" are in stock and available for use; however, new procurements are not authorized.[18] DLA Aviation had two obsolete parts that were replaced with newer models. See Table 4 for the estimated inventory value for the obsolete parts.

Table 4. Estimated Inventory Value of Obsolete V-22 Osprey Spare Parts

Part Description	Unit Price*	Total Inventory	Estimated Value
Aircraft Strut	$ 1,020	718	$732,360
Aircraft Fairing	4,549	155	705,056
Total		**873**	**$1,437,416**

* Minor inconsistencies in the unit prices may occur due to rounding.

We identified concerns that DLA Aviation may not maximize its use of existing inventories, as required by DoD Guidance.[19] Specifically, DLA Aviation did not require these obsolete parts to be linked to replacement parts in its system. As a result, when customers order parts, DLA Aviation officials may not know that obsolete models of the parts are available for use. Therefore, officials could purchase and sell replacement parts without using the obsolete parts already in inventory.

For example, DLA Aviation retained 718 obsolete aircraft struts in inventory, which were replaced with a new part. The obsolete aircraft struts were not linked with the replacement part in DLA Aviation's system. Therefore, unless customers specifically request the obsolete part, DLA Aviation cannot ensure that its officials know that 718 obsolete aircraft struts are available to sell to customers and those parts could become excessive inventory.

After we met with DLA Aviation officials, they linked the obsolete aircraft struts to the replacement part in the system. However, if DLA Aviation does not require all obsolete parts identified as "use until stock is exhausted" to be linked to the replacement parts in their system, DLA increases the risk of retaining excessive inventory for other obsolete parts.

[18] DoD Manual 4100.39-M, Volume 10, "FLIS Procedures Manual Multiple Application References/Instructions/Tables and Grids," October 2010.

[19] DoD Manual 4140.01, Volume 2, "DoD Supply Chain Materiel Management Procedures: Demand and Supply Planning," February 10, 2014.

Recommendations, Management Comments, and Our Response

Recommendation 1

We recommended the Director, Defense Logistics Agency:

a. Evaluate the reasonableness of V-22 Osprey spare-parts inventory quantities to ensure they do not retain or procure excessive inventory.

Defense Logistics Agency Comments

The Executive Director, Support, DLA Logistics Operations, responding for the Director, DLA, agreed, stating that DLA Aviation reviews monthly inventory on all spare parts, including the V-22. In addition, he stated that DLA Aviation has monthly processes to review potential over-procurements.

Our Response

Comments from the Executive Director partially addressed the recommendation. The Executive Director's comments did not address the reasonableness of V-22 Osprey spare-parts inventory quantities. We agree that DLA Aviation conducted monthly reviews of V-22 Osprey spare-parts inventory and has a process to review potential over-procurements. DLA Aviation's monthly reviews categorized V-22 Osprey spare-parts inventory quantities as AAO, ERS, CRS, and PRS and identified disposal recommendations. DLA Aviation's process to review potential over-procurements assessed existing purchase orders to determine whether purchases for additional inventory were necessary or should be canceled. However, these reviews did not evaluate whether spare-parts inventory quantities were reasonable. For example, DLA Aviation reviewed inventory quantities for aircraft chassis assemblies and categorized all 18 parts in inventory as AAO. It will take DLA Aviation approximately 18 years to use all 18 parts. However, DLA Aviation did not assess the reasonableness of retaining this quantity. Therefore, we request the Director, DLA, provide additional comments in response to the final report that address the reasonableness of V-22 Osprey spare-part inventory.

b. Review inventory identified as economic retention stock and contingency retention stock and determine whether it was properly categorized. In addition, document its retention and approval decisions, if applicable; re-categorize the inventory, as appropriate; and initiate the review and disposal process for V-22 Osprey spare parts categorized as potential reutilization stock.

Defense Logistics Agency Comments

The Executive Director, Support, DLA Logistics Operations, responding for the Director, DLA, agreed, stating that DLA Aviation follows DoD and DLA policies and procedures related to economic and retention stock categories.

Our Response

Comments from the Executive Director partially addressed the recommendation. The Executive Director's comments did not address whether DLA Aviation would determine whether economic retention stock and contingency retention stock was properly categorized; re-categorize the inventory, if needed; document its retention and approval decisions; or initiate the review and disposal process for potential reutilization stock. Although the Executive Director stated that DLA Aviation followed policies and procedures related to economic and retention stock, DLA Aviation did not comply with DoD guidance specific to documenting its decisions and approval for retaining economic and contingency retention stock. For example, DLA Aviation relied on its computer system to categorize its retention stock inventory and did not document or justify its rationale for categorizing inventory as retention stock. Specifically, DLA Aviation did not document its decision to retain air XMSN housing parts as economic retention stock or senior management's approval and decision to retain wiring harnesses as contingency retention stock. In addition, DLA Aviation did not review the potential reutilization stock of wiring harnesses for transfer to DLA Disposition Services for disposal, as required by DoD guidance. Therefore, we request the Director, DLA, provide additional comments in response to the final report that address the categorization of retention stock, documentation of retention and approval decisions, and initiation of the review and disposal process for potential reutilization stock.

c. Establish a plan for conducting periodic reviews of forecasting results to ensure DLA Aviation officials do not purchase excessive V-22 Osprey spare-parts inventory.

Defense Logistics Agency Comments

The Executive Director, Support, DLA Logistics Operations, responding for the Director, DLA, agreed, stating that DLA Aviation planners conduct monthly reviews of over- and under-forecasted items.

Our Response

Comments from the Executive Director partially addressed the recommendation. The Executive Director's comments did not address reviewing forecast results from the inventory management techniques used to identify demand for V-22 Osprey spare parts. We agree that DLA Aviation conducted monthly reviews to determine whether select purchase orders for additional inventory were necessary. However, these reviews did not include the forecasting results of the statistical and SKU Build inventory management techniques. For example, although DLA Aviation conducted monthly reviews, officials still purchased excessive inventory for 8 parts using several inventory management techniques. DLA Aviation could put the $0.7 million in holding costs for excessive parts to better use. Therefore, we request the Director, DLA, provide additional comments in response to the final report that address a plan to conduct periodic reviews of forecasted results for V-22 Osprey spare-parts inventory.

Appendix A

Scope and Methodology

We conducted this performance audit from August 2014 through May 2015 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. We planned to determine whether the DoD properly accounted for Government-owned V-22 inventory managed by private contractors. However, DLA Aviation managed all of the V-22 spare parts that we reviewed. Therefore, this part of the audit objective was not applicable to our audit scope.

Nonstatistical Audit Sample of V-22 Osprey Spare Parts

We identified a basic ordering agreement[20] to review V-22 Osprey consumable spare parts. We used the Electronic Document Access database to identify delivery orders awarded on the basic ordering agreement. We identified over 5,000 V-22 Osprey spare parts purchased on these delivery orders. According to DLA's Office of Operations Research and Resource Analysis, DLA managed 3,730 of these parts.

To identify potential excess inventory, we used DLA's Office of Operations Research and Resource Analysis to obtain an inventory report, which included demand, inventory in stock, and inventory values for these parts. We nonstatistically selected for review 56 V-22 Osprey spare parts, managed by DLA, with the highest potential excess inventory. We subsequently reduced our sample to 53 V-22 Osprey spare parts to only include parts that DLA Aviation managed. See Appendix B for the summary of V-22 Osprey spare parts reviewed.

Interviews and Documentation

To determine whether DLA Aviation effectively managed Government-owned V-22 Osprey spare parts before it purchased the same parts from private contractors, we reviewed DLA Aviation and NAVSUP WSS inventory documentation for all 53 spare parts. For example, we reviewed:

- transferred inventory quantities and dates;
- supply and demand data;
- on-hand and due-in inventory;

[20] We identified basic ordering agreement SPRPA1-09-G-004Y, which was awarded on August 12, 2009.

- prices;
- requirement objectives;
- obsolete parts identified as "use until stock is exhausted;"
- forecasting algorithms;
- ordering and holding costs; and
- stratification data.

We reviewed DoD regulations and guidance related to inventory management, such as inventory supply and demand management, excess inventory, disposal of inventory, obsolete parts, and forecasting techniques, to determine whether applicable guidance was followed for retaining inventory. Specifically, we reviewed:

- DoD Manual 4140.01, Volume 1, "DoD Supply Chain Materiel Management Procedures: Operational Requirements;"
- DoD Manual 4140.01, Volume 2, "DoD Supply Chain Materiel Management Procedures: Demand and Supply Planning;"
- DoD Manual 4140.26-M, Volume 4, "DoD Integrated Materiel Management (IMM) for Consumable Items: Logistics Reassignment (LR);"
- DoD Manual 4140.01, Volume 5, "DoD Supply Chain Materiel Management Procedures: Delivery of Materiel;"
- DoD Manual 4140.01, Volume 6, "DoD Supply Chain Materiel Management Procedures: Materiel Returns, Retention, and Disposition;"
- DoD Manual 4140.01, Volume 10, "DoD Supply Chain Materiel Management Procedures: Metrics and Inventory Stratification Reporting;"
- DoD "Comprehensive Inventory Management Improvement Plan;"
- DLA Instruction, "Retention and Disposal Policy (Draft);" and
- NAVSUP Instruction 4500.13A, "Retention and Reutilization of Material Assets."

We interviewed:

- NAVSUP WSS inventory management officials in Philadelphia, Pennsylvania, and DLA inventory management officials in Richmond, Virginia, to discuss their processes for inventory management and applicable guidance; and
- DLA Headquarters officials in Fort Belvoir, Virginia, to discuss inventory management policies and information system controls.

We contacted Bell-Boeing Joint Project Office officials in California, Maryland, to discuss the inventory management of Government-owned V-22 Osprey spare parts.

Method Used to Determine Excessive Inventory

To determine whether DLA Aviation had excessive V-22 Osprey spare parts for the 53 spare parts reviewed, we compared DLA Aviation's total inventory quantities to the inventory quantities we determined were reasonable. We calculated reasonable inventory quantities for each part by adding the quantity of parts needed to replenish an item's stock and an additional 2 years of our future demand. We excluded eight nonforecastable parts from our excessive inventory results because DLA Aviation used the Peak and Next-Gen inventory management techniques to calculate demand. The DoD approved these techniques and considered the results reasonable. As a result, we determined that DLA Aviation retained excessive inventory for 22 of 53 V-22 Osprey spare parts.

Method Used to Determine Holding Costs

We calculated DLA Aviation's holding costs over 5 years for 22 parts with excessive inventory by comparing the holding costs for the entire inventory quantity to the holding costs for the inventory quantities we determined were reasonable. Specifically, we calculated the holding costs for the entire inventory as 3 percent of DLA Aviation's average annual on-hand inventory value, taking into consideration changes for future demand and due-in inventory. We calculated the holding costs for the inventory quantities we determined were reasonable as 3 percent of the reasonable inventory value.

Use of Computer-Processed Data

We used computer-processed data from DLA Aviation and NAVSUP WSS. To assess the reliability of the data, we compared it to source documents. Specifically, we compared DLA Aviation and NAVSUP WSS historical demand and purchase order data to their actual customer requisitions and purchase orders. We also compared NAVSUP WSS' records of inventory quantities transferred to DLA Aviation's records of inventory quantities received. As a result, we determined that DLA Aviation and NAVSUP WSS computer-processed data were sufficiently reliable to support our findings and conclusions.

Use of Technical Assistance

We consulted with the DoD OIG Quantitative Methods Division while determining our nonstatistical audit sample.

Appendix B

Summary of V-22 Osprey Spare Parts Reviewed

The following table lists the 53 V-22 Osprey spare parts that we nonstatistically selected for review. It also identifies the excessive inventory values for 22 spare parts; 31 spare parts did not have excessive inventory.

National Item Identification Number	Part Description	Value of Excessive Inventory
015322881	Intercom Station Control	$1,463,793.00
015702925	Aircraft Fairing	1,040,479.00
016168956	Support, Structural	844,500.50
015469781	Bearing Assembly Spher	744,675.75
015702927	Aircraft Fairing	477,618.75
015937307	Wiring Harness	435,474.73
015792666	Door Assembly, Aircraft	431,846.25
015469793	Race, Aircraft, Mater	414,823.50
015467060	Gear Sector (1) Bev	368,130.75
015467141	Air XMSN Housing	362,532.25
015469780	Carrier Set Plnty	346,301.25
015123501	Chassis, Assembly, Aircraft	286,629.00
016152421	Aircraft Frame	254,317.80
016152408	Aircraft Frame	249,499.38
015467075	Tapered Roller Bearing	239,107.78
014726092	Separator, Particle	221,550.00
015024619	Wiring Integration	158,460.00
015353396	Fan, Centrifugal	143,793.00
014443148	Cleat, Rope	111,989.25
014956002	Data Display Group	80,658.00
014719898	Fitting, Structural	47,339.89
015509134	Envlp, Pendant Cord	14,487.80
014180708	Bolt, Eccentric Head	–
014180810	Bearing, Sleeve	–
014183149	Sensor, Inertial System	–
014183208	Panel, Control, Electrical	–
014183273	Swivel and Link Assembly	–

National Item Identification Number	Part Description	Value of Excessive Inventory
014441973	Weight, Counterbalance	–
014441997	Shaft, Shouldered	–
014549016	Aircraft Strut	–
014549223	Coupling, Assembly, Tube	–
014552297	Coupling, Assembly	–
014648839	Hydraulic Fluid, Nonpetroleum	–
014719822	Shaft, Output APU	–
014720327	Detector, Ice	–
014726203	Grip Assembly, Controller	–
014744519	Torque Tube Assembly	–
014826868	Sensor Assembly, Aircraft	–
015048876	Wiring Integration	–
015054031	Retainer Assembly	–
015054037	Brace Assembly, Diagonal	–
015302513	Ianalog, PWA Aircraft	–
015302554	Backplane, Assembly	–
015322852	Wheel Assembly Main	–
015322857	Wiring Integration	–
015322858	Wheel Assembly, Nose	–
015443858	Bolt, Machine	–
015466992	Gear, Helical, Aircraft	–
015512287	CCA-NMB Aircraft	–
015544234	De Ice Test Set, Air	–
015658677	Circuit Card Assembly	–
015736318	Detector, Fire, Aircraft	–
015812825	Structural Fitting	–

Appendix C

Prior Coverage

During the last 5 years, the Government Accountability Office (GAO) and the DoD OIG issued 10 reports related to inventory and spare parts. Unrestricted GAO reports can be accessed at http://www.gao.gov. Unrestricted DoD OIG reports can be accessed at http://www.dodig.mil/pubs/index.cfm.

GAO

Report No. GAO-14-495, "Defense Inventory: Actions Needed to Improve the Defense Logistics Agency's Inventory Management," June 19, 2014

Report No. GAO-12-493, "Defense Inventory: Actions Underway to Implement Improvement Plan, but Steps Needed to Enhance Efforts," May 3, 2012

Report No. GAO-11-240R, "DoD's 2010 Comprehensive Inventory Management Improvement Plan Addressed Statutory Requirements, But Faces Implementation Challenges," January 7, 2011

Report No. GAO-10-469, "Defense Inventory, Defense Logistics Agency Needs to Expand on Efforts to More Effectively Manage Spare Parts," May 11, 2010

DoD OIG

Report No. DODIG-2014-064, "Improved Management Needed for the F/A-18 Engine Performance-Based Logistics Contracts," April 25, 2014

Report No. DODIG-2013-073, "Use of Defense Logistics Agency Excess Parts for High Mobility Multipurpose Wheeled Vehicle Depot Repairs Will Reduce Cost," April 25, 2013

Report No. DODIG-2013-025, "Accountability Was Missing for Government Property Procured on the Army's Services Contract for Logistics Support of Stryker Vehicles," November 30, 2012

Report No. DODIG-2012-004, "Changes Are Needed to the Army Contract With Sikorsky to Use Existing DoD Inventory and Control Cost at the Corpus Christi Army Depot," November 3, 2011

Report No. D-2011-061, "Excess Inventory and Contract Pricing Problems Jeopardize the Army Contract with Boeing to Support the Corpus Christi Army Depot," May 3, 2011

Report No. D-2010-063, "Analysis of Air Force Secondary Power Logistics Solution Contract," May 21, 2010

Appendix D

Years of Inventory for Twenty-Two V-22 Osprey Spare Parts

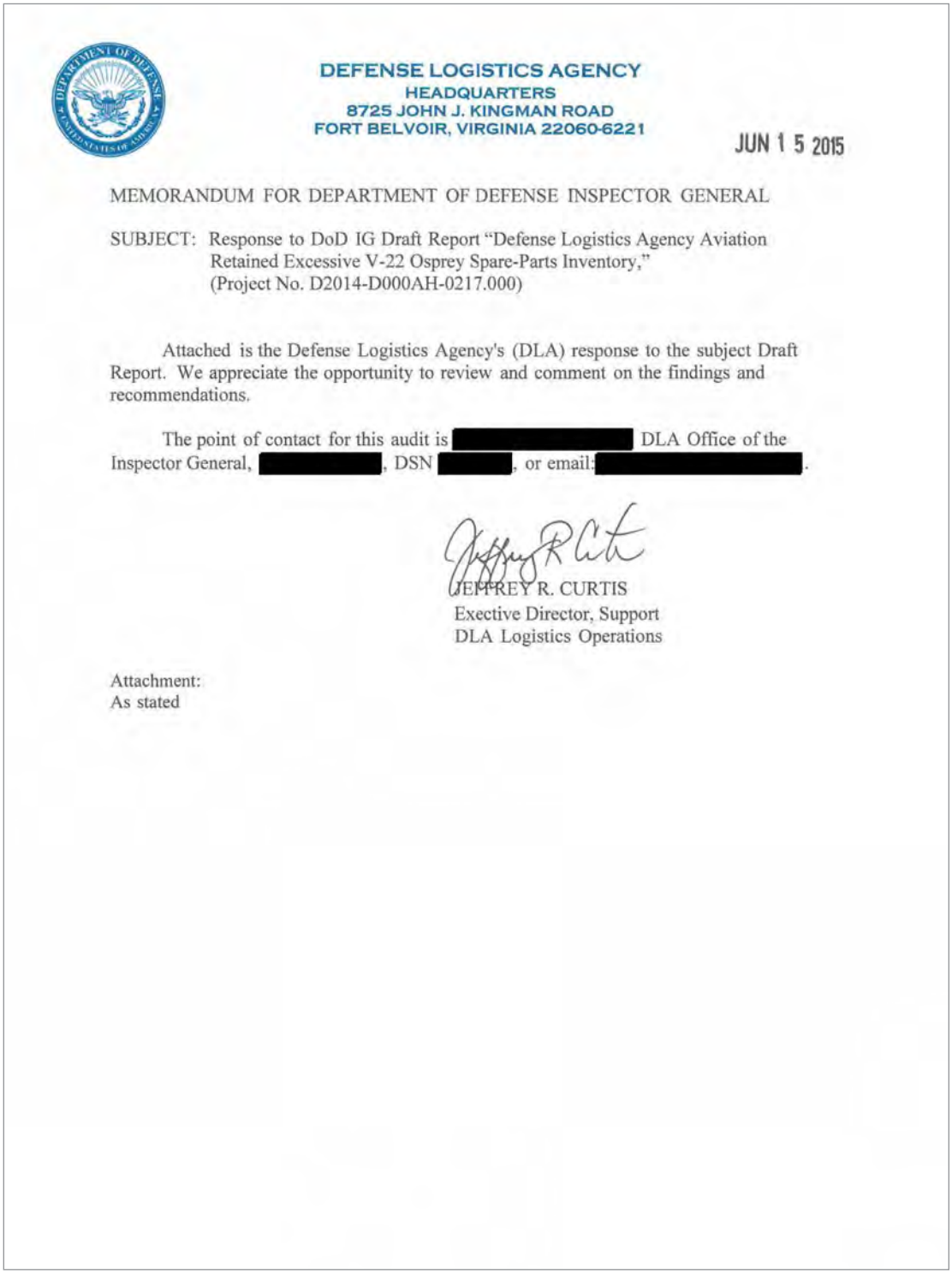
For 22 V-22 Osprey spare parts we reviewed with excessive inventory, the Table below identifies the total quantity of inventory DLA Aviation had and the annual average demand. In addition, it identifies the total years of inventory DLA Aviation retained for each part and how many years were excessive.

National Item Identification Number	Total Inventory (On-Hand and Due-In)	Annual Average Demand	Total Years of Inventory	Years of Inventory Not Excessive	Years of Excessive Inventory[1]
016152408	166.0	2.0	82.5	3.5	79.0
016152421	164.0	2.0	81.0	3.5	77.5
015467075	54.0	2.0	27.0	8.0	19.0
015792666	21.0	1.0	21.0	2.0	19.0
015123501	18.0	1.0	18.0	4.0	14.0
015322881	236.0	20.0	11.8	2.9	9.0
014726092	49.0	5.0	9.8	2.8	7.0
014443148	583.0	52.0	11.2	4.4	6.8
015469793	45.0	4.0	11.3	4.8	6.5
016168956	280.0	26.0	10.8	5.2	5.6
015469781	188.0	18.0	10.4	5.4	5.1
015702925	191.0	28.0	6.8	2.5	4.3
015702927	155.0	25.0	6.2	2.0	4.2
015024619	23.0	4.0	5.8	3.3	2.5
015469780	13.0	2.0	6.5	4.0	2.5
015353396	81.0	18.0	4.5	3.1	1.4
014956002	22.0	8.0	2.8	2.0	0.8
014719898	383.0	58.0	6.6	6.1	0.5
015509134	59.0	12.0	4.1	4.0	0.1
015467060	13.0	–[2]	–	–	–
015467141	41.0	–	–	–	–
015937307	29.0	–	–	–	–

[1] Minor inconsistencies in the years of excessive inventory may occur due to rounding.
[2] DLA Aviation did not establish quantities for restocking the part and did not have any customer demand in the past 5 years. Therefore, we could not calculate the number of years of inventory.

Management Comments

Defense Logistics Agency Comments



DEFENSE LOGISTICS AGENCY
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JUN 15 2015

MEMORANDUM FOR DEPARTMENT OF DEFENSE INSPECTOR GENERAL

SUBJECT: Response to DoD IG Draft Report "Defense Logistics Agency Aviation Retained Excessive V-22 Osprey Spare-Parts Inventory," (Project No. D2014-D000AH-0217.000)

Attached is the Defense Logistics Agency's (DLA) response to the subject Draft Report. We appreciate the opportunity to review and comment on the findings and recommendations.

The point of contact for this audit is [redacted] DLA Office of the Inspector General, [redacted], DSN [redacted], or email: [redacted].

JEFFREY R. CURTIS
Exective Director, Support
DLA Logistics Operations

Attachment:
As stated

Defense Logistics Agency Comments (cont'd)

Response to DoD IG Draft Report " Defense Logistics Agency Aviation Retained Excessive V-22 Osprey Spare-Parts Inventory," (Project No. D2014-DOOOAH-0217.000)

As requested, Defense Logistics Agency (DLA) is providing the following responses to the recommendations. Additional comments will be provided for your consideration under separate cover.

Recommendation 1. We recommend that the Director, DLA Aviation evaluate the reasonableness of V-22 Osprey spare-parts inventory quantities to ensure they do not retain or procure excessive inventory.

Response: Concur. DLA Aviation reviews monthly inventory on all spare parts, to include the V-22. DLA Aviation also has monthly processes in place to review potential over-procurements.

Recommendation 2. We recommend the Director, DLA Aviation, review inventory identified as economic retention stock and contingency retention stock and determine whether it was properly categorized. In addition, document its retention and approval decisions, if applicable; re-categorize the inventory, as appropriate; and initiate the review and disposal process for V-22 Osprey spare parts categorized as potential reutilization stock.

Response: Concur. DLA Aviation follows DoD and DLA policies and procedures related to economic and retention stock categories.

Recommendation 3: We recommend the Director, DLA Aviation establish a plan for conducting periodic reviews of forecasting results to ensure DLA Aviation officials do not purchase excessive V-22 Osprey spare-parts inventory.

Response: Concur. DLA Aviation planners conduct monthly reviews of over- and under-forecasted items.

DODIG PROJECT NO. D2014-DOOOAH-0217.000

Acronyms and Abbreviations

AAO	Approved Acquisition Objective
CRS	Contingency Retention Stock
DLA	Defense Logistics Agency
ERS	Economic Retention Stock
NAVSUP	Naval Supply Systems Command
PRS	Potential Reutilization Stock
SKU	Stock Keeping Unit
WSS	Weapon Systems Support


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