Report No. DODIG-2019-036

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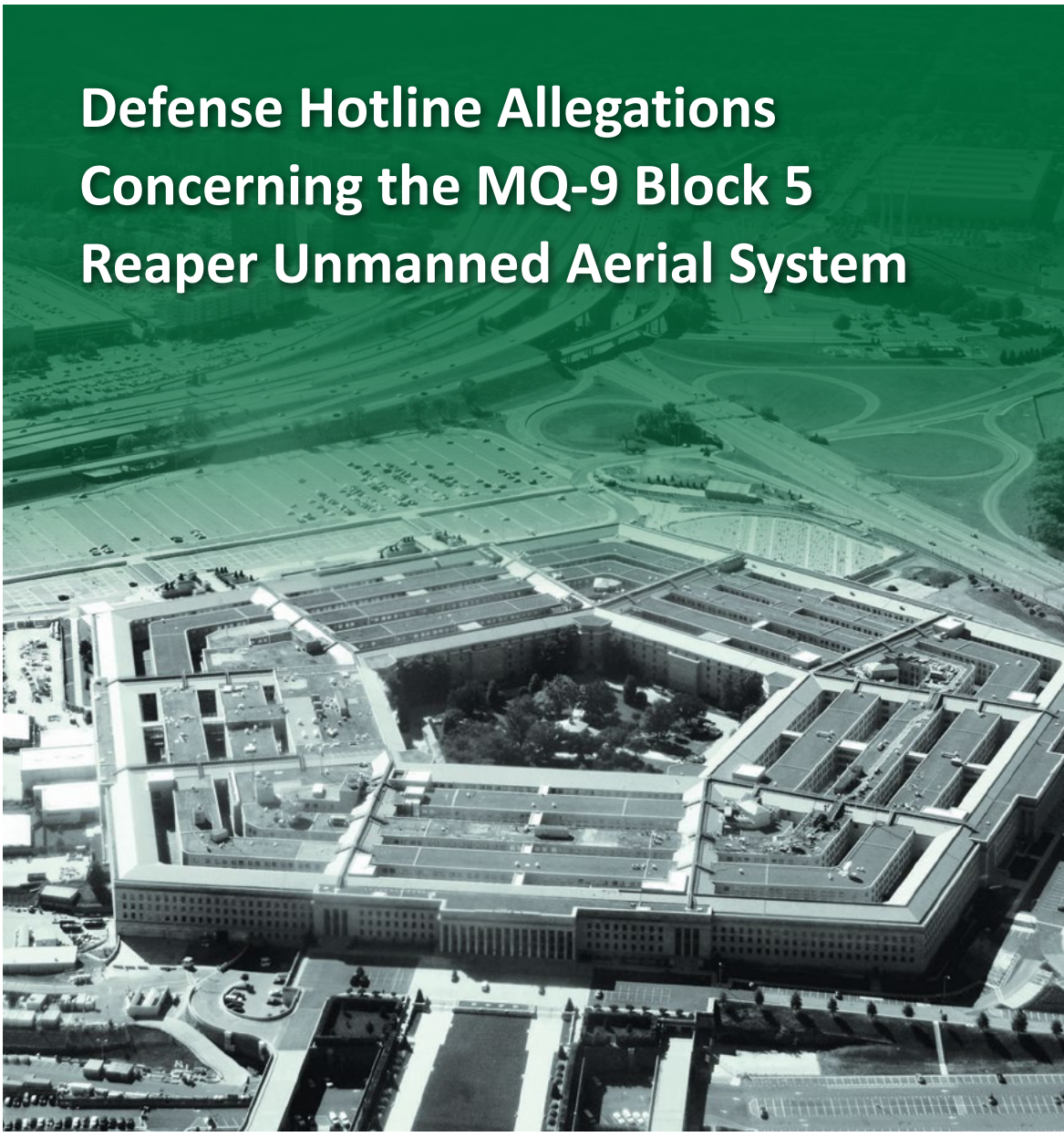
INSPECTOR GENERAL

U.S. Department of Defense

DECEMBER 12, 2018

Defense Hotline Allegations Concerning the MQ-9 Block 5 Reaper Unmanned Aerial System



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Results in Brief

Defense Hotline Allegations Concerning the MQ-9 Block 5 Reaper Unmanned Aerial System

December 12, 2018

Objective

We conducted this audit in response to allegations made to the DoD Hotline. We determined whether the U.S. Air Force was: (1) inappropriately charged for MQ-9 Reaper (MQ-9) Block 5 aircraft repairs prior to the Air Force accepting the aircraft, (2) using the MQ-9 Block 5 aircraft to support operational missions, and (3) properly estimating and procuring MQ-9 Block 5 aircraft spare parts.

Background

In November 2017, the DoD Hotline received an allegation that the Air Force had been inappropriately charged for repairs on the MQ-9 Block 5 aircraft prior to Government acceptance. In January 2018, the complainant made additional allegations that the Air Force was not using the MQ-9 Block 5 aircraft for operational missions and that the Air Force procured excess MQ-9 Block 5 aircraft spare parts because the aircraft was not flying.

The MQ-9 is an armed, medium-altitude, long-endurance unmanned aircraft. The MQ-9 is capable of performing multiple missions, including intelligence, surveillance, reconnaissance, close air support, and combat search and rescue. The MQ-9 includes two models, Block 1 and Block 5. The MQ-9 Block 5 aircraft provides upgraded communications, avionics, electrical power, and capabilities.

Finding

The Air Force was appropriately charged for MQ-9 Block 5 aircraft repairs prior to accepting the aircraft and was using MQ-9 Block 5 aircraft for operational missions. However, the Air Force procured excess MQ-9 Block 5 aircraft spare parts. Specifically, MQ-9 Program Management Office (PMO) officials procured an available inventory of 5,456 MQ-9 Block 5 aircraft spare parts, valued at $92.6 million that included 3,746 excess spare parts, valued at $30.9 million. Our analysis is based on 3 years of demand data because DoD guidance requires that DoD Components limit their on-hand inventory to 3 years of operating stock.

(~~FOUO~~) MQ-9 PMO officials procured excess spare parts because they did not have enough historical data on the MQ-9 Block 5 aircraft, which began flying combat missions in June 2017, to determine the accurate quantity of future spare parts needed. A General Atomics Aeronautical Systems, Inc. (GA-ASI) official explained that the aircraft has not yet accumulated enough actual flight hours to provide reliable historical data. As a result, MQ-9 PMO officials owned 3,746 excess spare parts, valued at $30.9 million. Additionally, MQ-9 PMO officials may be [redacted] the MQ-9 Block 5 aircraft as flight hours increase because there may be [redacted] of 1,105 other spare parts, valued at $22.5 million. The current demand data provided by MQ-9 PMO officials identified spare parts that have been requested in the past 3 years, but were not on hand in sufficient quantities to meet projected needs.

Recommendations

We recommend that the Medium Altitude Unmanned Aerial Systems Division Senior Materiel Leader direct the MQ-9 PMO to:

- Incorporate actual spare parts use, as flight hours increase and data becomes available, when forecasting for MQ-9 Block 5 aircraft spare parts, in accordance with DoD Manual 4140.01, volume 2.
- Use the excess MQ-9 Block 5 aircraft spare parts before purchasing additional spare parts.

Results in Brief

Defense Hotline Allegations Concerning the MQ-9 Block 5 Reaper Unmanned Aerial System

Management Comments and Our Response

The Medium Altitude Unmanned Aerial Systems Division Senior Materiel Leader agreed with our recommendations. The Senior Materiel Leader agreed to incorporate actual spare parts use when forecasting MQ-9 Block 5 spare parts and use the excess MQ-9 Block 5 spare parts before purchasing additional spare parts.

The recommendations are resolved but will remain open. We will close these recommendations when the Senior Materiel Leader provides documentation to support that the MQ-9 PMO had GA-ASI incorporate actual spare parts use and existing MQ-9 Block 5 spare parts inventory into the Aircraft Sustainability Model when forecasting MQ-9 Block 5 spare parts. Incorporating existing MQ-9 Block 5 spare parts inventory into the forecasting model will validate that the Air Force uses excess MQ-9 Block 5 spare parts before purchasing additional spare parts.

Please see the Recommendations Table on the next page for the status of the recommendations.

Recommendations Table

Management	Recommendations Unresolved	Recommendations Resolved	Recommendations Closed
Senior Materiel Leader, Medium Altitude Unmanned Aerial Systems Division	None	1.a and 1.b	None

Note: The following categories are used to describe agency management's comments to individual recommendations.

- **Unresolved** – Management has not agreed to implement the recommendation or has not proposed actions that will address the recommendation.
- **Resolved** – Management agreed to implement the recommendation or has proposed actions that will address the underlying finding that generated the recommendation.
- **Closed** – OIG verified that the agreed upon corrective actions were implemented.


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December 12, 2018

MEMORANDUM FOR AUDITOR GENERAL, DEPARTMENT OF THE AIR FORCE

SUBJECT: Defense Hotline Allegations Concerning the MQ-9 Block 5 Reaper Unmanned Aerial System (Report No. DODIG-2019-036)

We are providing this report for your information and use. We conducted this audit in response to allegations made to the DoD Hotline and in accordance with generally accepted government auditing standards.

We considered management comments to a draft of this report when preparing the final report. Comments from the Medium Altitude Unmanned Aerial Systems Division Senior Materiel Leader conformed to the requirements of DoD Instruction 7650.03; therefore, we do not require additional comments.

We appreciate the cooperation and assistance received during the audit. Please direct questions to Mr. Kenneth B. VanHove at (216) 535-3777 (DSN 499-9946).

Theresa S. Hull
Assistant Inspector General
Acquisition, Contracting, and Sustainment

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Introduction

Objective

We conducted this audit in response to allegations made to the Defense Hotline. We determined whether the U.S. Air Force was: (1) inappropriately charged for MQ-9 Reaper (MQ-9) Block 5 aircraft repairs prior to the Air Force accepting the aircraft, (2) using the MQ-9 Block 5 aircraft to support operational missions, and (3) properly estimating and procuring MQ-9 Block 5 aircraft spare parts. See Appendix A for a discussion of the scope and methodology and prior audit coverage related to the objective.

Background

On November 8, 2017, the DoD Hotline received an allegation related to the MQ-9 Block 5 aircraft. The complainant made additional allegations on January 23, 2018. Specifically, the complainant raised the following concerns:

1. The Air Force failed to identify mischarging on MQ-9 Block 5 aircraft maintenance contracts. The complainant alleged that the Air Force had been charged on the wrong contract for repairs on the MQ-9 Block 5 aircraft prior to Government acceptance.
2. The Air Force was not using the MQ-9 Block 5 aircraft to support operational missions.
3. The Air Force procured excess MQ-9 Block 5 aircraft spare parts because the aircraft was not flying. See the Finding for detailed information.

The DoD OIG evaluated additional allegations from the complainant regarding the MQ-9 Block 5 aircraft as part of a separate project. Specifically, the DoD OIG evaluated the allegations that an Air Force lead engineer incorrectly categorized and inappropriately accepted nonconforming material, and that acceptance testing was performed in the morning, when the air temperatures were cooler, to prevent the aircraft from overheating. The DoD OIG did not substantiate either allegation; the results of that evaluation are discussed in Report No. DODIG-2018-146, "Hotline Allegations Regarding the Acceptance and Testing of the MQ-9 Reaper Aircraft," August 16, 2018.

MQ-9 Reaper

The MQ-9 is an armed, medium-altitude, long-endurance unmanned aircraft. The MQ-9 is capable of performing multiple missions, including intelligence, surveillance, reconnaissance, close air support, and combat search and rescue. The MQ-9 includes two models, Block 1 and Block 5. The MQ-9 Block 5 aircraft provides upgraded communications, avionics, electrical power, and capabilities. The MQ-9 Block 5 aircraft uses 80 percent of the same parts as the MQ-9 Block 1 aircraft—the remaining 20 percent are unique to the MQ-9 Block 5 aircraft. See Figure for a picture of the MQ-9 aircraft.

The Air Force Life Cycle Management Center, (AFLCMC) Medium Altitude Unmanned Aerial Systems Division, located in Wright-Patterson Air Force Base, Ohio, manages the acquisition and sustainment of the MQ-9 and other unmanned aerial systems. The MQ-9 Program Management Office (PMO), led by the Medium Altitude Unmanned Aerial Systems Division Senior Materiel Leader, is responsible for overseeing, executing, and leading all development, test, integration, acquisition, and sustainment activities for the MQ-9. In addition, the MQ-9 PMO oversees the Medium Altitude Unmanned Aerial System Division Detachment 3 (Detachment 3). Detachment 3 is located in Poway, California, and provides acquisition support, depot services (including warehouse activities), and flight testing. Air Combat Command (ACC) shares responsibility with AFLCMC for the MQ-9 aircraft. ACC is responsible for approving the MQ-9 aircraft for deployment, overseeing current operations, providing operational guidance, generating aircraft requirements, and tracking spare parts availability.

Figure. MQ-9 Block 5 Aircraft
Source: The Air Force.

MQ-9 Block 5 Contracts

General Atomics Aeronautical Systems, Inc. (GA-ASI) manufactures the MQ-9 for the Air Force. GA-ASI is responsible for the production, sustainment, and inventory management of spare parts. The AFLCMC used two basic ordering agreements to buy the MQ-9 Block 5 aircraft. A basic ordering agreement is a written instrument of understanding, negotiated between a contracting office and a contractor, that contains terms and clauses that apply to future orders. The AFLCMC awarded the first basic ordering agreement in 2010 and the second in 2015, both for 5-year periods. From 2012 to 2017, the AFLCMC issued five delivery orders under the basic ordering agreements for the purchase of 132 MQ-9 Block 5 aircraft and initial spare parts with a total value of $1.5 billion. In these delivery orders, AFLCMC awarded both firm-fixed-price line items and fixed-price incentive with firm target line items. A firm-fixed-price line item does not allow for a price adjustment. A fixed-price incentive with a firm target line item establishes a maximum amount that may be paid to the contractor. The contractor absorbs any cost that exceeds that amount.

In addition, the AFLCMC awarded contractor logistics support (CLS) contracts to GA-ASI for 2015 through 2018. A CLS contract is defined as contracted weapon system sustainment, which includes contractor-provided aircraft and engine overhaul, repair and replenishment of parts, sustainment engineering, and supply chain management. The CLS contracts included maintenance and procurement of spare parts with a total value of $1.4 billion.

Review of Internal Controls

DoD Instruction 5010.40 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.[1] The Air Force internal controls over the MQ-9 Block 5 aircraft repairs prior to Government acceptance, MQ-9 Block 5 aircraft use, and the MQ-9 Block 5 aircraft spare parts inventory were effective as they applied to the audit objectives.

[1] DoD Instruction 5010.40, "Managers' Internal Control Program Procedures," May 30, 2013.

Finding

Mischarging and Use Allegations Were Not Substantiated; However, Excess Inventory Exists

The Air Force was appropriately charged for MQ-9 Block 5 aircraft repairs prior to accepting the aircraft and was using MQ-9 Block 5 aircraft for operational missions. However, MQ-9 PMO officials procured an available inventory of 5,456 MQ-9 Block 5 aircraft spare parts, valued at $92.6 million, that included 3,746 excess spare parts, valued at $30.9 million.[2]

(~~FOUO~~) MQ-9 PMO officials procured excess spare parts because they did not have enough historical data on the MQ-9 Block 5 aircraft, which began flying combat missions in June 2017, to determine the accurate quantity of future spare parts needed. Of the 3,746 excess spare parts procured, 1,664 spare parts were procured based on an evaluation conducted at the time of purchase while 2,082 were purchased over demand. As a result, MQ-9 PMO officials owned 3,746 excess spare parts, valued at $30.9 million. Additionally, MQ-9 PMO officials may be [redacted] the MQ-9 Block 5 aircraft as flight hours increase because there may be [redacted] of 1,105 other spare parts, valued at $22.5 million.

MQ-9 Block 5 Aircraft Repairs Prior to Acceptance

The Air Force was appropriately charged for MQ-9 Block 5 aircraft repairs prior to accepting the aircraft.[3] The specific allegation was that repairs were being charged to the CLS contract rather than being included in the production delivery orders.

Between July 2011 and April 2018, the Air Force accepted 78 MQ-9 Block 5 aircraft. (See Appendix B for the acceptance date of each MQ-9 Block 5 aircraft.) We reviewed 72 of the 78 aircraft for pre-acceptance mischarging.[4] GA-ASI is the prime contractor for the CLS contracts and production delivery orders, and MQ-9 Block 5 aircraft repairs occur under both. According to an MQ-9 PMO official, the same repair teams that perform repairs to MQ-9 Block 5 aircraft under the CLS contracts sometimes perform work under the production delivery orders, depending on workload. GA-ASI officials stated that no pre-acceptance repair work was charged to the CLS contract and provided documentation to support that all 72 aircraft received

[2] The finding only pertains to the 20 percent of spare parts that are unique to the MQ-9 Block 5 aircraft.

[3] GA-ASI refers to repairs prior to the Air Force accepting the aircraft as "rework."

[4] The six aircraft not reviewed were early production aircraft and the pre-acceptance repair work records for those aircraft were maintained in a legacy computer system no longer used. Therefore, the contractor could not provide the information in a timely manner.

repairs to address production flaws prior to Air Force acceptance. GA-ASI officials stated that they conducted all pre-acceptance repair work under the appropriate production delivery order.

(~~FOUO~~) GA-ASI tracks pre-acceptance repair work by issuing a quality notice (QN). GA-ASI issued [redacted] QNs that identified the tail number of the aircraft, description of the work completed, date of the repair, and a work breakdown structure (WBS) element. A WBS is an organized method to itemize a product into sub-products at lower levels of detail for use in planning, cost estimating, execution, and control. The WBS element tracks the pre-acceptance work to a specific delivery order. See Table 1 for the number of MQ-9 Block 5 aircraft repaired prior to Air Force acceptance for each basic ordering agreement, delivery order, and the total number of QNs issued.

(~~FOUO~~) Table 1. Delivery Order Charged for MQ-9 Block 5 Aircraft Pre-Acceptance Repair Work

(~~FOUO~~) Basic Ordering Agreement	Delivery Order	Number of Aircraft Repaired Prior to Acceptance	Quality Notices
FA8620-10-G-3038	0052	[redacted]	[redacted]
FA8620-10-G-3038	0050	[redacted]	[redacted]
FA8620-10-G-3038	0077	[redacted]	[redacted]
FA8620-15-G-4040	0007	[redacted]	[redacted]
Total		[redacted]	[redacted] ~~(FOUO)~~

Source: GA-ASI.

We reviewed the QNs for 72 MQ-9 Block 5 aircraft and identified that GA-ASI conducted the pre-acceptance repair work on delivery orders under the two basic ordering agreements used for the production of MQ-9 Block 5 aircraft. Based on the results of our analysis, we determined that the pre-acceptance repair work was not charged to the CLS contract; therefore, we did not substantiate the allegation.

MQ-9 Block 5 Aircraft Use

The Air Force was using MQ-9 Block 5 aircraft for operational missions. The complainant alleged that MQ-9 Block 5 aircraft were sitting unused in boxes at different Air Force and Air National Guard bases because the aircraft could not fly. MQ-9 PMO officials explained that, prior to the fielding authorization, many MQ-9 Block 5 aircraft were stored in boxes because the MQ-9 Block 5 aircraft had testing deficiencies that required correction before it could be fielded. We reviewed the 78 MQ-9 Block 5 aircraft flight hours and status to determine the use of each MQ-9 Block 5 aircraft.

(~~FOUO~~) The Air Force began accepting MQ-9 Block 5 aircraft in July 2011 to conduct developmental testing, which verifies that the system meets technical requirements. Air Force officials conducted an operational assessment in May 2012 to support acquisition milestone decisions. Air Force officials originally planned to conduct follow-on operational test and evaluation in FY 2014, but had to conduct further developmental testing in FYs 2014 and 2015 and were not able to conduct follow-on operational test and evaluation until January through November 2016. Follow-on operational test and evaluation reevaluates the system to ensure that it continues to meet operational needs and retains its effectiveness. During follow-on operational test and evaluation, Air Force officials identified deficiencies in the MQ-9 Block 5 aircraft and determined that it was not operationally effective or suitable. [redacted] According to the ACC Deputy Director of Plans, Programs, and Requirements, Air Force officials verified that the deficiencies were corrected through test flights and authorized the fielding of the MQ-9 Block 5 aircraft in May 2017.

A month after ACC officials authorized the fielding of the MQ-9 Block 5 aircraft, the Air Force began flying the aircraft in combat missions. As of April 2018, the MQ-9 Block 5 aircraft had accumulated 24,083 flight hours, including 18,396 combat hours, 4,780 training hours, and 907 testing hours. (See Appendix B for the MQ-9 Block 5 aircraft actual flight hours by tail number.)

A month after ACC officials authorized the fielding of the MQ-9 Block 5 aircraft, the Air Force began flying the aircraft in combat missions.

(~~FOUO~~) The Air Force used the 78 MQ-9 Block 5 aircraft to support operational missions. According to ACC MQ-9 requirements, the MQ-9 aircraft is intended to perform combat missions, training, and testing. Based on our analysis, there were four categories of MQ-9 Block 5 aircraft use: combat, training, testing, and retrofit. Of the 78 MQ-9 Block 5 aircraft, the Air Force used [redacted] aircraft for combat missions. An ACC official stated that the Air Force plans to increase the number of MQ-9 Block 5 aircraft used for combat missions. The Air Force used [redacted] of the 78 MQ-9 Block 5 aircraft for training, such as pilot sensor training that qualifies student pilots and sensor operators on the MQ-9 aircraft. The Air Force used [redacted] of the 78 MQ-9 Block 5 aircraft for testing, such as developmental testing. The remaining [redacted] MQ-9 Block 5 aircraft were undergoing or awaiting retrofits to provide additional capabilities to the standard production MQ-9 Block 5 aircraft. Therefore, we did not substantiate the allegation that the Air Force was not using MQ-9 Block 5 aircraft for operational missions. See Table 2 for the MQ-9 Block 5 aircraft use.

(~~FOUO~~) Table 2. MQ-9 Block 5 Aircraft Use

(~~FOUO~~) Aircraft Use Category	Number of Aircraft
Combat	[redacted]
Training	[redacted]
Testing	[redacted]
Retrofit	[redacted]
Total	**78** (~~FOUO~~)

Source: ACC and MQ-9 PMO.

MQ-9 Block 5 Aircraft Spare Parts Inventory

MQ-9 PMO officials procured an available inventory of 5,456 MQ-9 Block 5 aircraft spare parts, valued at $92.6 million, that included 3,746 excess spare parts, valued at $30.9 million. The complainant alleged that the Air Force had procured excess spare parts because the aircraft could not fly operational missions. We substantiated part of the allegation because the Air Force purchased 2,082 of the 3,746 excess spare parts, valued at $10.7 million, over 3-year use. We did not substantiate part of the allegation because an MQ-9 PMO official stated that the remaining 1,664 of the 3,746 excess spare parts, valued at $20.2 million, were necessary based on information available at the time of purchase.

DoD guidance requires that DoD Components limit purchases to a maximum quantity of 2 years of stock based on use, but provides an exception in which purchases should not result in on-hand inventory exceeding 3 years of operating stock.[5] MQ-9 PMO officials provided a 3-year demand history for the MQ-9 Block 5 aircraft.[6] We compared the spare parts on hand to the 3 years of demand data to identify spare parts needed for sustainment and spare parts in excess of 3 years of demand data. As of April 30, 2018, the spare parts inventory included 1,710 spare parts, valued at $61.7 million, that were needed to sustain the MQ-9 Block 5 aircraft and 3,746 excess spare parts, valued at $30.9 million.

Parts Needed for Sustainment Based on Current Demand Data

(~~FOUO~~) The Air Force purchased 1,710 spare parts, valued at $61.7 million, which were needed to sustain the MQ-9 Block 5 aircraft. For example, MQ-9

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

[6] Although the Air Force provided 3 years of parts use, most of the use occurred after the Air Force began flying the MQ-9 Block 5 aircraft in June 2017. The Air Force accumulated only 2.5 percent of the total MQ-9 Block 5 aircraft flight hours between July 2011 and the start of combat missions in June 2017. The Air Force accumulated the remaining 97.5 percent of total MQ-9 Block 5 aircraft flight hours since the start of combat missions.

(~~FOUO~~) PMO officials identified that, in the past 3 years, an antenna cover plate, costing [redacted], was needed twice. The Air Force has two of the antenna cover plates. Based on the current demand data, it is estimated that the two cover plates will be needed within the next 3 years so these parts comply with DoD guidance.

Excess Spare Parts

The Air Force purchased 3,746 excess spare parts, valued at $30.9 million.

The Air Force purchased 3,746 excess spare parts, valued at $30.9 million. An MQ-9 PMO official stated that 2,082 excess spare parts, valued at $10.7 million, were purchased to reduce the risk of the MQ-9 Block 5 aircraft becoming nonoperational. According to an MQ-9 PMO official, these spare parts were identified by a group of field engineers, subject matter experts, and PMO personnel. This group identified needed spare parts based on experience, parts' shelf lives, supply history, aircraft location, and actual flight hour data. Specifically, MQ-9 PMO officials identified:

- (~~FOUO~~) 1,290 of the 2,082 excess spare parts that MQ-9 PMO officials know will be needed based on historical maintenance information and were less expensive to purchase during production. For example, MQ-9 PMO officials purchased 1,199 cables, valued at [redacted]. MQ-9 PMO officials stated that, based on experience with previous MQ-9 aircraft, cables around the engine generate a lot of heat and wear out quickly. Purchasing extra cables during production costs less and eliminates future down time for the aircraft. In another example, MQ-9 PMO officials purchased a set of extra wings, valued at [redacted] so that a wing damaged on landing can be replaced quickly.
- (~~FOUO~~) 792 of the 2,082 excess spare parts do not have current demand data but are expected to be ordered for field users once MQ-9 Block 5 aircraft flight hours increase. For example, MQ-9 PMO officials identified a check valve assembly, valued at [redacted] which has not been used in the last 3 years. However, MQ-9 PMO officials determined that the part will be needed sometime in the future and purchased 28, totaling [redacted]

(~~FOUO~~) Additionally, MQ-9 PMO officials stated that the remaining 1,664 of the 3,746 excess spare parts, valued at $20.2 million, were determined to be necessary based on information available at the time the spare parts were procured. For example, MQ-9 PMO officials identified that, in the past 3 years, users requested a tank distribution valve assembly, costing [redacted] 17 times. MQ-9 PMO officials had 53 of the tank distribution valve assemblies in inventory, resulting in an excess of 36 tank distribution value assemblies, totaling [redacted]

Lack of MQ-9 Block 5 Aircraft Data

MQ-9 PMO officials did not have enough historical data on the MQ-9 Block 5 aircraft to determine the accurate quantity of future spare parts needed.

MQ-9 PMO officials did not have enough historical data on the MQ-9 Block 5 aircraft, which began flying combat missions in June 2017, to determine the accurate quantity of future spare parts needed. A GA-ASI official explained that the aircraft has not yet accumulated enough actual flight hours to provide reliable historical data. According to a GA-ASI official, once the MQ-9 Block 5 aircraft reaches 100,000 flight hours, actual spare parts use can be used for forecasting the requirements. As of April 2018, the MQ-9 Block 5 aircraft had accumulated 24,083 flight hours. Without knowing the actual maintenance requirement for each spare part, it is difficult to forecast spare parts. In an effort to offset the lack of historical data, MQ-9 PMO officials used their experience to identify and purchase spare parts to reduce the risk of the MQ-9 Block 5 aircraft becoming nonoperational.

The Air Force purchased spare parts within the MQ-9 Block 5 aircraft spare parts inventory through the delivery orders issued under the basic ordering agreements for MQ-9 Block 5 aircraft production. The MQ-9 Block 5 production delivery orders require GA-ASI to recommend the initial spare parts and quantities needed to support the MQ-9 Block 5 aircraft for 2 years. GA-ASI officials stated they began using the Aircraft Sustainability Model (ASM), a forecasting software, for the FY 2017 production delivery order to generate the recommended initial spare parts list. According to GA-ASI officials, prior to ASM, forecasting was a manual process and was not as accurate. GA-ASI officials explained that they enter many data elements into ASM, including:

- logistical support-related data that identifies maintenance tasks, parts and intervals, mean time between failures, supply chain delays, and mean time to repair;
- estimated MQ-9 Block 5 aircraft flight hours;
- data related to the modeling of the supply chain structure that identifies how, where, and how long it takes for the parts to move;
- data related to the modeling of operations tempo that identifies the number of aircraft, sorties, and locations; and
- support requirements and assumptions based on aircraft mission availability requirements.[7]

[7] Mean time between failures is the average elapsed time between failures.

Based on this information, ASM develops a spare parts list and the projected cost. Adjustments can be made to the data inputs to evaluate different operational and maintenance scenarios, effects on aircraft and mission availability based on funding or other constraints, and the basis and justification for supporting spare part procurements. An MQ-9 PMO official stated that they review the recommended spare parts list and adjust it based on factors such as additional aircraft, location, and flight hours. According to an MQ-9 PMO official, ASM's accuracy will increase as more MQ-9 Block 5 aircraft actual flight data becomes available. A GA-ASI official stated that, in addition to actual flight data, the Air Force needs to provide more specific MQ-9 Block 5 requirement information, such as flight locations and transportation times, in order to increase ASM's accuracy. Additionally, GA-ASI officials stated that, when available, demand data will be reviewed to establish the demand pattern for the past 3 years, with due consideration for intervening design and mission changes. MQ-9 PMO officials stated that they will adjust future spare part purchases based on the available inventory. MQ-9 PMO officials should incorporate actual spare parts use, as flight hours increase and data becomes available, when forecasting for MQ-9 Block 5 aircraft spare parts, in accordance with DoD guidance.[8]

Excess and Shortage of MQ-9 Block 5 Aircraft Spare Parts

(~~FOUO~~) MQ-9 PMO officials owned 3,746 excess spare parts, valued at $30.9 million. The Air Force had spare parts that were not needed to sustain the MQ-9 Block 5 aircraft for the next 3 years. However, based on flight hour projections for future MQ-9 sustainment, ACC officials estimated that the flight hours of the MQ-9 fleet, which includes Block 1 and Block 5 aircraft, will increase by [redacted] percent, from [redacted] flight hours in FY 2018 to [redacted] flight hours by FY 2025. ACC and MQ-9 PMO officials explained that, currently, more Block 1 aircraft are supporting the MQ-9 requirements than Block 5 aircraft because the Air Force has more Block 1 aircraft. However, according to MQ-9 PMO officials, the Air Force plans to accept an additional 148 MQ-9 Block 5 aircraft through FY 2023. These additional aircraft will shift the MQ-9 fleet to a majority of Block 5 aircraft. The increase in MQ-9 Block 5 aircraft flight hours will lead to an increase in the use of MQ-9 Block 5 aircraft spare parts. Therefore, MQ-9 PMO officials should use the excess MQ-9 Block 5 aircraft spare parts before purchasing additional spare parts.

MQ-9 PMO officials should use the excess MQ-9 Block 5 aircraft spare parts before purchasing additional spare parts.

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

(~~FOUO~~) Additionally, MQ-9 PMO officials may be [redacted] the MQ-9 Block 5 aircraft as flight hours increase because there may be [redacted] of 1,105 other spare parts, valued at $22.5 million. The current demand data provided by MQ-9 PMO officials identified spare parts that have been requested in the past 3 years, but were not on hand in sufficient quantities to meet projected needs. For example, filter element fluid, costing [redacted] was requested 17 times in the past 3 years; however, the Air Force had none in inventory. In another example, a battery unit assembly, costing [redacted] was requested 281 times in the past 3 years. The Air Force had only 129 in inventory, resulting in a potential shortage of 152 battery unit assemblies over the next 3 years.

Recommendations, Management Comments, and Our Response

Recommendation 1

We recommend that the Medium Altitude Unmanned Aerial Systems Division Senior Materiel Leader direct the MQ-9 Program Management Office to:

a. **Incorporate actual spare parts use, as flight hours increase and data becomes available, when forecasting for MQ-9 Block 5 aircraft spare parts, in accordance with DoD Manual 4140.01, volume 2.**

b. **Use the excess MQ-9 Block 5 aircraft spare parts before purchasing additional spare parts.**

Senior Materiel Leader, Medium Altitude Unmanned Aerial Systems Division Comments

The Medium Altitude Unmanned Aerial Systems Division Senior Materiel Leader agreed with our recommendations. The Senior Materiel Leader agreed to incorporate actual spare parts use when forecasting MQ-9 Block 5 spare parts and use the excess MQ-9 Block 5 spare parts before purchasing additional spare parts. The Senior Materiel Leader stated that forecasting spare parts is an iterative and ongoing process.

Our Response

Recommendations 1.a and 1.b are resolved but will remain open. We will close these recommendations when the Senior Materiel Leader provides documentation to support that the MQ-9 PMO had GA-ASI incorporate actual spare parts use and existing MQ-9 Block 5 spare parts inventory into ASM when forecasting MQ-9 Block 5 spare parts. Incorporating existing MQ-9 Block 5 spare parts inventory into the forecasting model will validate that the Air Force uses excess MQ-9 Block 5 spare parts before purchasing additional spare parts.

Appendix A

Scope and Methodology

We conducted this performance audit from April through November 2018 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.

To determine whether the Air Force was (1) inappropriately charged for MQ-9 Block 5 aircraft repairs prior to the Air Force accepting the aircraft, (2) using the MQ-9 Block 5 aircraft to support operational missions, and (3) properly estimating and procuring MQ-9 Block 5 aircraft spare parts, we interviewed officials from the following components to identify their roles and responsibilities:

- Office of the Secretary of the Air Force for Acquisition, Technology, and Logistics;
- Office of the Secretary of the Air Force for Financial Management;
- ACC;
- MQ-9 PMO;
- Defense Contract Management Agency; and
- GA-ASI.

To determine whether the Air Force was inappropriately charged for MQ-9 Block 5 aircraft repairs prior to the Air Force accepting the aircraft, MQ-9 PMO officials provided the Material Inspection and Receiving Report (DD Form 250) for 78 MQ-9 Block 5 aircraft that the Air Force had accepted. GA-ASI officials provided QN data associated with 72 MQ-9 Block 5 aircraft that received repairs prior to Air Force acceptance. GA-ASI did not provide QN data for six MQ-9 Block 5 aircraft because they were early production aircraft and the records were maintained in a legacy computer system no longer used. Therefore, the contractor could not provide the information in a timely manner. We determined that not having the QN data for the six aircraft was acceptable because we were able to review 92 percent of the MQ-9 Block 5 aircraft, including all MQ-9 Block 5 aircraft accepted within the past 3 years, and that was enough to make a substantiation decision. In addition, GA-ASI officials provided a WBS element listing. We identified the contract charged for all pre-acceptance repair work by comparing the QN data to the WBS listings. We compared the delivery orders charged for the pre-acceptance work on each MQ-9 Block 5 aircraft to the DD Form 250s for the MQ-9 Block 5 aircraft to identify

whether the delivery orders matched. Finally, we obtained the MQ-9 Block 5 CLS and production delivery orders to verify that only production delivery orders were charged for pre-acceptance repair work.

To determine whether the Air Force was using the MQ-9 Block 5 aircraft to support operational missions, we met with ACC and MQ-9 PMO officials to learn the purpose of the MQ-9 Block 5 aircraft and how the Air Force was using them. MQ-9 PMO officials provided operational mission actual flight hour data as of April 2018, by tail number, for the 78 accepted MQ-9 Block 5 aircraft. The actual flight hour data identified testing, training, and combat flight hours. We analyzed the MQ-9 Block 5 aircraft actual flight hours to identify total MQ-9 Block 5 aircraft flight hours for combat, testing, and training. Finally, we obtained a status of MQ-9 Block 5 aircraft with low flight hours from ACC and MQ-9 PMO officials to identify the current use of the MQ-9 Block 5 aircraft.

To determine whether the Air Force was properly estimating and procuring MQ-9 Block 5 aircraft spare parts, we interviewed MQ-9 PMO and GA-ASI officials to identify the spare parts forecasting process. We obtained a spare parts inventory from MQ-9 PMO officials, as of April 30, 2018, that identified the MQ-9 Block 5 aircraft spare parts, the quantity on hand, and 3 years of demand data. We met with MQ-9 PMO officials to learn about the spare parts inventory. We limited our review to the 20 percent of the spare parts that are unique to the MQ-9 Block 5 aircraft. We compared the spare parts on hand to 3 years of demand data to identify excess and shortages. We also obtained the spare part lead times from GA-ASI and determined that none had lead times over 17 months that would warrant holding excess inventory of spare parts.

Use of Computer-Processed Data

We used computer-processed data obtained from the Air Force systems Reliability and Maintainability Information System (REMIS) and Government Online Data (GOLD). Specifically, we used REMIS data to identify actual flight hours for the MQ-9 Block 5 aircraft. We used GOLD to identify the inventory of spare parts. Additionally, we used computer-processed data obtained from the GA-ASI Systems, Applications, and Products in Data Processing (SAP) to identify the work completed on MQ-9 Block 5 aircraft prior to Air Force acceptance and lead times for spare parts. We compared the tail numbers contained in REMIS data to the DD Form 250s to ensure the completeness of the data. We also compared the spare part numbers contained in GOLD to the spare part numbers contained in the lead-time data from SAP to ensure completeness of the data. Additionally, we compared QN data from SAP to the MQ-9 Block 5 aircraft contracts. Based on our comparisons, we determined that the data was sufficiently reliable for the purposes of this report.

Prior Coverage

During the last 5 years, the DoD OIG and the Air Force issued four reports discussing the MQ-9 aircraft and the management of inventories of spare parts from GA-ASI. Unrestricted DoD OIG reports can be accessed at http://www.dodig.mil/reports.html/. Unrestricted Air Force Audit Agency reports can be accessed from https://efoia.milcloud.mil/App/ReadingRoom.aspx by clicking on AF FOIA Library.

DoD OIG

Report No. DODIG-2018-146, "Hotline Allegations Regarding the Acceptance and Testing of the MQ-9 Reaper Aircraft," August 16, 2018

> The evaluation determined whether a Defense Hotline complaint regarding the acceptance and testing of the MQ-9 Reaper aircraft was substantiated. Specifically, the DoD OIG evaluated an allegation that an Air Force lead engineer incorrectly categorized and inappropriately accepted nonconforming material, and an allegation that Air Force personnel performed flight tests early in the morning to prevent the aircraft from overheating and obtain favorable flight test results. The evaluation did not substantiate either allegation.

Report No. DODIG-2016-080, "Army's Management of Gray Eagle Spare Parts Needs Improvement," April 29, 2016

> The audit determined whether the Department of the Army effectively managed MQ-1C Gray Eagle spare parts inventory and purchased the parts at fair and reasonable prices. The DoD OIG found that the Army did not effectively manage Gray Eagle parts inventory because it did not report parts on its financial statements, had obsolete and excess parts, and did not use Defense Logistics Agency inventory prior to procuring parts from General Atomics. As a result, Army officials undervalued inventory on the annual Army financial statements; retained obsolete and excess inventory; may pay additional storage costs to maintain obsolete and excess spare parts at its warehouse; and may pay more on future spare parts purchased from General Atomics.

Report No. DODIG-2014-123, "Air Force Did Not Justify the Need for MQ-9 Reaper Procurement Quantities," September 30, 2014

> The audit determined whether the Air Force justified the overall procurement quantity of 401 MQ-9 aircraft. The DoD OIG found that the Air Force did not justify the need for the planned procurement quantity of 401 MQ-9 aircraft, at an estimated cost of $76.8 billion. This occurred because Air Force officials did not follow the Joint Capabilities Integration Development System requirements to obtain Joint Requirements Oversight Council approval for an

increase in procurement quantity, and did not conduct and maintain consistent, complete, and verifiable analysis for determining the necessary aircraft quantity. As a result, the Air Force risked spending approximately $8.8 billion to purchase, operate, and maintain 46 MQ-9 aircraft it may not need.

Air Force

Report No. AFAA F2014-0001-L30000, "MQ-1 Predator and MQ-9 Reaper Ground Control Stations," November 8, 2013

The audit determined whether Air Force officials could more effectively manage the acquisition of Ground Control Stations. Air Force officials did not adequately manage technical system requirements for the Block 30 Ground Control Station upgrade. In addition, Air Force officials did not establish accurate budget requirements for Block 50 Ground Control Stations. Specifically, program officials included Block 50 Ground Control Station quantities in the FY 2013 President's Budget that exceeded user requirements by 60 units. Air Force officials took corrective actions during the audit to reduce Ground Control Station quantities in the FY 2014 President's Budget that allowed program officials to put funds totaling $322 million to better use. The report did not contain recommendations requiring further action because Air Force management completed five corrective actions during the audit.

Appendix B

MQ-9 Block 5 Aircraft Acceptance Dates, Flight Hours, and Use

MQ-9 PMO officials identified that the Air Force accepted 78 MQ-9 Block 5 aircraft and provided the actual combat, training, and testing flight hours for each MQ-9 Block 5 aircraft along with acceptance documentation for the aircraft. ACC and MQ-9 PMO officials provided a status of MQ-9 Block 5 aircraft with low flight hours. We categorized the MQ-9 Block 5 aircraft into four categories (combat, retrofit, training, and test) based on the actual flight hours and status descriptions. See Table 4 for a listing of the acceptance date, actual flight hours, and aircraft use, by MQ-9 Block 5 aircraft tail number.

(~~FOUO~~) Table 4. MQ-9 Block 5 Aircraft Acceptance Dates, Actual Flight Hours, and Use

(~~FOUO~~) Number	Tail Number	Acceptance Date	Combat Hours	Training Hours	Test Hours	Aircraft Use
1	[redacted]	12/23/2015	[redacted]	[redacted]	[redacted]	[redacted]
2	[redacted]	8/3/2016	[redacted]	[redacted]	[redacted]	[redacted]
3	[redacted]	8/3/2016	[redacted]	[redacted]	[redacted]	[redacted]
4	[redacted]	8/10/2016	[redacted]	[redacted]	[redacted]	[redacted]
5	[redacted]	8/8/2016	[redacted]	[redacted]	[redacted]	[redacted]
6	[redacted]	9/20/2016	[redacted]	[redacted]	[redacted]	[redacted]
7	[redacted]	9/28/2016	[redacted]	[redacted]	[redacted]	[redacted]
8	[redacted]	8/31/2016	[redacted]	[redacted]	[redacted]	[redacted]
9	[redacted]	10/14/2016	[redacted]	[redacted]	[redacted]	[redacted]
10	[redacted]	9/29/2016	[redacted]	[redacted]	[redacted]	[redacted]
11	[redacted]	9/30/2016	[redacted]	[redacted]	[redacted]	[redacted]
12	[redacted]	11/4/2016	[redacted]	[redacted]	[redacted]	[redacted]
13	[redacted]	10/31/2016	[redacted]	[redacted]	[redacted]	[redacted]
14	[redacted]	4/28/2017	[redacted]	[redacted]	[redacted]	[redacted]
15	[redacted]	11/23/2016	[redacted]	[redacted]	[redacted]	[redacted]
16	[redacted]	11/23/2016	[redacted]	[redacted]	[redacted]	[redacted]
17	[redacted]	12/1/2016	[redacted]	[redacted]	[redacted]	[redacted]
18	[redacted]	9/11/2017	[redacted]	[redacted]	[redacted]	[redacted]
19	[redacted]	9/19/2017	[redacted]	[redacted]	[redacted]	[redacted]
20	[redacted]	10/24/2017	[redacted]	[redacted]	[redacted]	[redacted] (~~FOUO~~)

(~~FOUO~~) Table 4. MQ-9 Block 5 Aircraft Acceptance Dates, Actual Flight Hours, and Use (cont'd)

(~~FOUO~~) Number	Tail Number	Acceptance Date	Combat Hours	Training Hours	Test Hours	Aircraft Use
21	[redacted]	4/26/2017	[redacted]	[redacted]	[redacted]	[redacted]
22	[redacted]	6/8/2017	[redacted]	[redacted]	[redacted]	[redacted]
23	[redacted]	7/27/2017	[redacted]	[redacted]	[redacted]	[redacted]
24	[redacted]	8/10/2017	[redacted]	[redacted]	[redacted]	[redacted]
25	[redacted]	8/7/2017	[redacted]	[redacted]	[redacted]	[redacted]
26	[redacted]	8/15/2017	[redacted]	[redacted]	[redacted]	[redacted]
27	[redacted]	8/22/2017	[redacted]	[redacted]	[redacted]	[redacted]
28	[redacted]	8/22/2017	[redacted]	[redacted]	[redacted]	[redacted]
29	[redacted]	1/30/2018	[redacted]	[redacted]	[redacted]	[redacted]
30	[redacted]	1/25/2018	[redacted]	[redacted]	[redacted]	[redacted]
31	[redacted]	1/31/2018	[redacted]	[redacted]	[redacted]	[redacted]
32	[redacted]	4/23/2018	[redacted]	[redacted]	[redacted]	[redacted]
33	[redacted]	7/7/2011	[redacted]	[redacted]	[redacted]	[redacted]
34	[redacted]	1/21/2014	[redacted]	[redacted]	[redacted]	[redacted]
35	[redacted]	11/12/2015	[redacted]	[redacted]	[redacted]	[redacted]
36	[redacted]	9/30/2015	[redacted]	[redacted]	[redacted]	[redacted]
37	[redacted]	3/2/2016	[redacted]	[redacted]	[redacted]	[redacted]
38	[redacted]	11/13/2015	[redacted]	[redacted]	[redacted]	[redacted]
39	[redacted]	8/3/2016	[redacted]	[redacted]	[redacted]	[redacted]
40	[redacted]	8/5/2016	[redacted]	[redacted]	[redacted]	[redacted]
41	[redacted]	8/3/2016	[redacted]	[redacted]	[redacted]	[redacted]
42	[redacted]	5/26/2017	[redacted]	[redacted]	[redacted]	[redacted]
43	[redacted]	5/15/2017	[redacted]	[redacted]	[redacted]	[redacted]
44	[redacted]	12/19/2013	[redacted]	[redacted]	[redacted]	[redacted]
45	[redacted]	11/8/2013	[redacted]	[redacted]	[redacted]	[redacted]
46	[redacted]	2/27/2014	[redacted]	[redacted]	[redacted]	[redacted]
47	[redacted]	3/20/2014	[redacted]	[redacted]	[redacted]	[redacted]
48	[redacted]	9/4/2015	[redacted]	[redacted]	[redacted]	[redacted]
49	[redacted]	9/2/2015	[redacted]	[redacted]	[redacted]	[redacted]
50	[redacted]	1/14/2016	[redacted]	[redacted]	[redacted]	[redacted]
51	[redacted]	11/8/2016	[redacted]	[redacted]	[redacted]	[redacted]
52	[redacted]	11/3/2016	[redacted]	[redacted]	[redacted]	[redacted]
53	[redacted]	10/28/2016	[redacted]	[redacted]	[redacted]	[redacted] (~~FOUO~~)

(~~FOUO~~) Table 4. MQ-9 Block 5 Aircraft Acceptance Dates, Actual Flight Hours, and Use (cont'd)

(~~FOUO~~) Number	Tail Number	Acceptance Date	Combat Hours	Training Hours	Test Hours	Aircraft Use
54	[redacted]	11/18/2016	[redacted]	[redacted]	[redacted]	[redacted]
55	[redacted]	12/8/2016	[redacted]	[redacted]	[redacted]	[redacted]
56	[redacted]	2/28/2017	[redacted]	[redacted]	[redacted]	[redacted]
57	[redacted]	5/26/2017	[redacted]	[redacted]	[redacted]	[redacted]
58	[redacted]	12/15/2016	[redacted]	[redacted]	[redacted]	[redacted]
59	[redacted]	3/30/2017	[redacted]	[redacted]	[redacted]	[redacted]
60	[redacted]	4/4/2017	[redacted]	[redacted]	[redacted]	[redacted]
61	[redacted]	6/6/2017	[redacted]	[redacted]	[redacted]	[redacted]
62	[redacted]	7/7/2017	[redacted]	[redacted]	[redacted]	[redacted]
63	[redacted]	6/8/2017	[redacted]	[redacted]	[redacted]	[redacted]
64	[redacted]	6/23/2017	[redacted]	[redacted]	[redacted]	[redacted]
65	[redacted]	6/27/2017	[redacted]	[redacted]	[redacted]	[redacted]
66	[redacted]	7/25/2017	[redacted]	[redacted]	[redacted]	[redacted]
67	[redacted]	7/6/2017	[redacted]	[redacted]	[redacted]	[redacted]
68	[redacted]	9/7/2017	[redacted]	[redacted]	[redacted]	[redacted]
69	[redacted]	10/11/2017	[redacted]	[redacted]	[redacted]	[redacted]
70	[redacted]	9/29/2017	[redacted]	[redacted]	[redacted]	[redacted]
71	[redacted]	9/29/2017	[redacted]	[redacted]	[redacted]	[redacted]
72	[redacted]	10/5/2017	[redacted]	[redacted]	[redacted]	[redacted]
73	[redacted]	10/17/2017	[redacted]	[redacted]	[redacted]	[redacted]
74	[redacted]	10/24/2017	[redacted]	[redacted]	[redacted]	[redacted]
75	[redacted]	12/13/2017	[redacted]	[redacted]	[redacted]	[redacted]
76	[redacted]	1/19/2018	[redacted]	[redacted]	[redacted]	[redacted]
77	[redacted]	4/2/2018	[redacted]	[redacted]	[redacted]	[redacted]
78	[redacted]	4/26/2018	[redacted]	[redacted]	[redacted]	[redacted]
Total			**18,396***	**4,780***	**907***	**(~~FOUO~~)**

*Columns do not sum due to rounding

Note 1: Testing Aircraft. The MQ-9 Block 5 aircraft that are categorized as test aircraft and have less than 20 hours have been used for developmental testing, in test laboratories such as hardware and software, or for a cooperative research and development agreement.

Note 2: Training Aircraft. The MQ-9 Block 5 aircraft that are categorized as training aircraft and have less than 20 hours have been used for pilot sensor training, modification verification and training, as ground maintenance trainers, or have flown additional training hours since MQ-9 PMO officials provided the actual flight hours in April 2018.

Source: MQ-9 PMO.

Management Comments

Medium Altitude Unmanned Aerial Systems Division

DEPARTMENT OF THE AIR FORCE
AIR FORCE LIFE CYCLE MANAGEMENT CENTER
WRIGHT-PATTERSON AIR FORCE BASE OHIO

NOV 19 2018

MEMORANDUM FOR Department of Defense (DoD) Inspector General (IG)

FROM: MQ-9 Program Management Office (PMO)
2530 Loop Road West, Bldg 560
Wright-Patterson AFB OH 45433-7101

SUBJECT: MQ-9 PMO Comments to DoD IG Recommendations and Public Release Review, in draft report (8 Nov 18) for Project No. D2018-D000AT-0126.000

1. For the recommendations review, MQ-9 PMO agrees with the two recommendations (1.a and 1.b). The MQ-9 PMO will incorporate actual spare parts use when forecasting MQ-9 Block 5 spare parts (1.a) and will use the excess MQ-9 Block 5 spare parts before purchasing additional spare parts (1.b). Since forecasting spare parts is an iterative/on-going process throughout the lifecycle, there is no completion date.

2. For the public release review, see attachment.

3. For questions, please contact my Point of Contact: [redacted]

MICHAEL W. JIRU, Jr., Col, USAF
Senior Materiel Leader
Medium Altitude UAS Division

Attachment:
Public Release Review

Acronyms and Abbreviations

ACC	Air Combat Command
AFLCMC	Air Force Life Cycle Management Center
ASM	Aircraft Sustainability Model
CLS	Contractor Logistics Support
GA-ASI	General Atomics Aeronautical Systems, Incorporated
GOLD	Government Online Data
PMO	Program Management Office
QN	Quality Notice
REMIS	Reliability and Maintainability Information System
SAP	Systems, Applications, and Products in Data Processing
WBS	Work Breakdown Structure

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