Department of Defense
Report to Congress on
Future Unmanned Aircraft Systems
Training, Operations, and
Sustainability

Under Secretary of Defense
for Acquisition, Technology and Logistics

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Preparation of this report/study cost the Department of Defense a total of approximately $17,000 in Fiscal Years 2011 – 2012.

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REPORTING REQUIREMENT:

This report is being provided to the congressional defense committees as requested in House Armed Services Committee Report 111-491, accompanying the Ike Skelton National Defense Authorization Act for Fiscal Year 2011.

TASK: Report on Future Unmanned Aerial Systems Training, Operations, and Sustainability.

The rapid growth of UAS inventories to meet operational demands raises a number of questions concerning the military services' ability to support these inventories in the near- and long-term. In particular, to support their UAS inventories, the military services must train sufficient numbers of personnel to operate and maintain the aircraft, provide adequate facilities and other infrastructure to sustain them, and provide sufficient access to airspace and training ranges to train military personnel within the United States and at military bases overseas.

The committee directs the Secretary of Defense to provide a report to the congressional defense committees with its fiscal year 2012 budget request that describes the military services' plans to support their current and planned UAS inventories. The report should, at a minimum, discuss:

(1) Current UAS inventory levels and planned UAS inventory levels for each fiscal year through 2017;

(2) Plans to supply the number of personnel needed to operate the aircraft and sensor payloads and to perform UAS maintenance;

(3) Current and planned UAS basing and other operating locations;

(4) Progress made in providing the number of facilities needed for UAS inventories to support operations and training and the funding required for any additional facilities; and

(5) The availability of airspace, ranges, and other infrastructure at each planned UAS location, and a description of the steps that the services plan to take to overcome any limitations that adversely impact UAS training.

Executive Summary

The Department of Defense (DoD) continues to increase its investment in unmanned aircraft systems (UAS) to meet battlefield commanders' demand for their unique capabilities. The emphasis on long-endurance, unmanned intelligence, surveillance and reconnaissance (ISR) assets – many with strike capabilities – is a direct reflection of recent operational experience and further Combatant Commander demands. This increase in demand has resulted in a large number of UAS capable of a wide range of missions. This large number of fielded UAS has also driven a strong demand for access within the National Airspace System (NAS). This need for airspace access to test new systems, train operators, and conduct continental United States (CONUS)-based missions has quickly exceeded the current airspace available for military operations. The situation will only be exacerbated as units return from overseas contingencies.

Currently, DoD UAS operations conducted outside of Restricted, Warning, and Prohibited areas are authorized under a temporary Certificate of Waiver or Authorization (COA) or waiver from the Federal Aviation Administration (FAA) or under limited conditions outlined in the 2007 DoD-FAA Memorandum of Agreement (MoA). DoD is actively engaged in coordinating efforts on behalf of the Military Departments and Combatant Commands to shorten and simplify the FAA COA process to allow greater unmanned access to the NAS, with direct engagement through the interagency UAS Executive Committee (ExCom). The UAS ExCom is a joint committee composed of senior executives from four member organizations: DoD, FAA, the Department of Homeland Security (DHS), and the National Aeronautics and Space Administration (NASA). The mission of the UAS ExCom is to enable increased and ultimately routine access of Federal UAS engaged in public aircraft operations into the NAS to support operational, training, development, and research requirements of FAA, DoD, DHS, and NASA. DoD is also pursuing ground-based and airborne sense-and-avoid efforts to eventually supplant or significantly reduce the need for COAs. In the future, DoD will continue to utilize Restricted, Warning, and Prohibited areas but will also continue to develop the necessary technologies to access other airspace safely and in accordance with applicable federal aviation regulations.

This document outlines planned force capability growth and forecasted attrition of UAS aircraft through FY 2017; Military Department personnel required for training and operations; personnel and aircraft basing intentions; and required military construction (MILCON) and airspace requirements for bases hosting UAS. Within the report, the Military Departments provide current and planned inventories, personnel requirements to operate and maintain the systems, planned bases and operating locations, and progress with facilities to support inventories. Also, the report addresses the airspace integration challenge through implementation of the DoD Airspace Integration Plan, multi-agency collaboration, and ongoing negotiations with FAA. The Military Departments have a cohesive plan to address basing, funding, and manning in support of forecasted training and operations.

Report

INTRODUCTION

Effective employment of UAS worldwide is an integral part of DoD military operations. UAS operations in the NAS are required to ensure direct mission support to Combatant Commanders to both train and maintain ready forces and pursue operational test activities for UAS. Additionally, UAS are utilized to conduct Homeland Defense/Homeland Security and, when approved by the Secretary of Defense, Defense Support of Civil Authorities (DSCA) missions (e.g., disaster relief, search and rescue). Accomplishing these missions requires airspace to efficiently train, develop, and support UAS operations. This report describes the Military Departments' UAS inventories, personnel, sustainment, and site plans to support and execute UAS missions from now through FY 2017.

SECTION 1 – ***Current UAS inventory levels and planned UAS inventory levels for each fiscal year through FY 2017:***

The following table describes the current UAS program of record inventory levels planned through FY 2017, net of attrition.

System Designation/Name		Current	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
			Air Force					
MQ-1B	Predator	163	152	141	130	121	115	110
MQ-9A	Reaper	70	96	135	167	199	229	256
RQ-4B *	Global Hawk	23	23	15	15	15	15	15
			Army					
RQ-11B	Raven	5394	6294	6528	6717	6921	7074	7074
RQ-7B	Shadow	408	408	408	408	408	408	408
MQ-5B	Hunter	45	45	45	45	45	45	45
MQ-1C	Gray Eagle	19	45	74	110	138	152	152
			Navy					
RQ-4A	Global Hawk	5	5	0	0	0	0	0
MQ-4C	BAMS	0	0	2	2	5	9	13
MQ-8B	Firescout/VTUAV	5	9	14	18	25	32	37
RQ-21A	STUAS	0	1	2	3	4	4	4
	Scan Eagle	122	122	122	122	122	122	122
X-47B	UCAS-D	2	2	2	2	0	0	0
	UCLASS	0	0	0	0	2	2	4
			Marine Corps					
RQ-7B	Shadow	52	52	52	52	52	52	52
RQ-21A	STUAS	8	8	8	23	48	73	100

Table 1: UAS Inventory Levels (FY12 budgeted inventory with noted exception)

* *Reflects RQ-4B Block 20/40 inventory remaining after FY 2012 (Block 30 cancelled in President's 2013 Budget submission).*

SECTION 2 – ***Plans to supply the number of personnel needed to operate the aircraft and sensor payloads and to perform UAS maintenance:***

This section provides manpower planning by the Military Departments for the necessary personnel to operate the aircraft and mission sensor. UAS pilots/operators require initial, continuation, upgrade, and proficiency/currency training sorties in the NAS. Similar requirements apply to sensor operators in their respective mission areas.

Air Force

As of December 16, 2011, the manpower requirements for Remote Piloted Aircraft (RPA) pilots and Sensor Operators (SO) to support 57 MQ-1/9 and 4 RQ-4 Combat Air Patrols (CAPs)[1], including operational, test, and training requirements, as well as appropriate overhead and staff requirements, were:

	MQ-1	MQ-9	RQ-4	Total
Pilots	1012	529	155	1696
SO	730	401	63	1194

Table 2: RPA Crew Manpower Requirements

As of December 16, 2011, the number of trained RPA pilots and SOs available and the resulting personnel shortfall to provide 57 MQ-1/9 and 4 RQ-4 CAPs, including operational, test, and training requirements, as well as appropriate overhead and staff requirements, was:

	MQ-1	MQ-9	RQ-4	Total	Current Shortfall
Pilots	726	455	177	1358	-338
SO	610	291	48	949	-245

Table 3: Current RPA Crew Manning Availability

The temporary shortfalls in aircrew manning were overcome by using a minimum of seven aircrews vice the programmed ten aircrews per CAP and by prioritizing operational, test, and training requirements above overhead and staff requirements.

Beginning on March 30, 2011, the Air Force was tasked to provide additional CAPs to support new contingency operations in Libya and a summer surge in Afghanistan. During the fall and winter of 2011, the Air Force provided 60 MQ-1/9 CAPs and 4 RQ-4 CAPs. The Air Force took the following actions in order to support this additional temporary surge:

[1] MQ-1/9: 4 aircraft per combat air patrol (CAP) and 10 mission control element (MCE) crews per CAP; RQ-4: 3 aircraft per CAP, 15 pilots for MCE, 5 pilots for launch and recovery element (LRE) and 15 sensor operators (SO) per orbit.

(a) Stood down a portion of the formal training to provide three CAPs;

(b) Mobilized Air Force Reserve (AFR) and Air National Guard (ANG) units to provide two CAPs for 7 months;

(c) Resourced ANG CAP with volunteers; and

(d) Accelerated the early stand up of two planned CAPs.

These actions impacted the production of trained aircrews, requiring the Air Force to reconstitute the force during FY 2012. On December 16, 2011, the Air Force reduced sourcing to 57 MQ-1/9 CAPs, allowing experienced aircrews to be reassigned to the formal training units at Holloman AFB as instructors. Additionally, the Air Force will increase hiring of contract instructors to augment uniformed instructors. These actions will enable the Air Force to increase RPA aircrew manning to full strength at a sustainable rate.

The FY 2015 manpower requirements for RPA pilots and SOs to provide 65 MQ-1/9 and 8 RQ-4 CAPs, including operational, test, and training requirements, as well as all overhead and staff requirements, are:

	MQ-1	MQ-9	RQ-4	Total
Pilots	902	858	300	2060
SO	657	647	150	1454

Table 4: FY 2015 RPA Crew Requirements

In order to meet this RPA aircrew manpower requirement, the Air Force has implemented two key initiatives. The first initiative created Undergraduate RPA Training (URT) for RPA pilots with the 18X Air Force Specialty Code (AFSC) as well as a distinct training pipeline for RPA SOs with the 1U AFSC. These programs solve the problem of insufficient capacity in existing pipelines (Undergraduate Pilot Training (UPT) and 1N AFSC training) to meet RPA aircrew operational requirements. URT production is planned at 60 for FY 2011, 146 for FY 2012, and 168 in FY 2013-2015, while the 1U training pipeline is planned for 353 in FY 2011, 327 in FY 2012, 255 in FY 2013, and 202 in FY 2014-2016. The 18X and 1U career fields will comprise the majority of the RPA aircrew force structure in the future. Until that time, the Air Force will continue to use traditional pilots with the 11X AFSC and SOs with the 1N and 1A AFSCs to augment the RPA aircrew requirement.

The second initiative increased the capacity of the MQ-1/9 Formal Training Units (FTUs) in order to meet operational RPA requirements. There is currently one active duty MQ-1 FTU and one active duty MQ-9 FTU as well as a launch and recovery training squadron. Additionally, there is an Air National Guard MQ-1 FTU and an Air National Guard MQ-9 FTU producing pilots in FY 2012. As the Air Force evolves toward an MQ-9

fleet, aircrew production focus will shift from MQ-1 to MQ-9, which will require standing up an additional active duty MQ-9 FTU. The expected capacity of the MQ-1/9 FTUs will be 310 initial qualification MQ-1/9 aircrew and 30 MQ-1 to MQ-9 aircrew conversions in FY 2012 and 360 initial qualification MQ-1/9 aircrew and 40 MQ-1 to MQ-9 aircrew conversions in FY 2013. These training slots support Active/Reserve Component and foreign training requirements. For the RQ-4, there is one active duty FTU that has a capacity of 72 pilots and 36 SOs per year. This RPA pilot training infrastructure and the associated capacity will enable the Air Force to meet the operational RPA aircrew requirement and continue to sustain the enterprise in the future.

Air Force RPA organizational level maintenance utilizes a combination of military and Contracted Logistics Support (CLS) personnel in support of operations. Organizational-level maintenance contractors primarily reside within the MQ-1 community, performing both home station and deployed maintenance actions alongside military maintenance technicians. Military maintenance personnel currently perform the majority of organizational level maintenance within the MQ-9 community. MQ-1/9s require up to 30 military maintenance personnel to stand-up an initial CAP. This number increases up to 65 military maintenance personnel supporting up to five CAPs. MQ-1 contractors gain efficiencies by conducting Cross Utilization Training (CUT) with their personnel enabling the contractor to conduct home station and deployed maintenance operations with a significantly smaller footprint. The RQ-4 also utilizes a combination of military maintenance and CLS personnel to perform the majority of organizational-level maintenance actions. RQ-4s require up to 60 military maintenance personnel per detachment to support operations. As with the MQ-1/9s, contractors gain efficiencies by conducting CUT training with their personnel to reduce footprint.

Original equipment manufacturers currently conduct all Air Force RPA depot-level maintenance actions. A Business Case Analysis (BCA) to determine a course of action for switching to a more organic depot structure is underway within the MQ-1/9 community. Preliminary findings will be concluded by June 2012. The Life Cycle Sustainment plan for the RQ-4 is complete and awaiting final signatures. A BCA to determine a course of action for switching to a more organic depot structure will follow in the near future.

Air Force Maintenance Career Field Managers conducted Utilization and Training Workshops in April and May of 2011 to determine training requirements for all aircraft maintenance AFSCs with the exception of Weapons. An interim mechanical RPA course (Crew Chief, Engines and Hydraulics technicians) began in August 2011. For the long term, robust mechanical and technical courses are currently under development with implementation of a mechanical course scheduled for August 2012.

Army

The Army uses three Military Occupation Specialties (MOS) to support UAS. Two of these MOS, 15W Operator and 15E Repairer, are for enlisted Soldiers and one, 150U Technician, is for a Warrant Officer. The exception to this is the small RQ-11B Raven systems which are operated by any Soldier qualified through a 10-day flight training course.

The 15W Operator is qualified to fly the aircraft, operate the sensors, and emplace/displace the system. Individual aircraft qualifications are tracked by an additional skill identifier. The 15W is the feeder MOS for the 150U Technician MOS.

The 15E Repairer is responsible for the maintenance of all parts of the UAS, to include the aircraft, ground control stations, data links, and supporting equipment. The 15E, like the 15W, has an additional skill identifier to denote specific system qualifications.

The 150U Warrant Officer provides leadership and expertise in the UAS unit. These individuals interface with their higher headquarters and provide oversight of aviation safety, standardization, and maintenance programs.

Manning numbers are based on Unit Modified Table of Organizational Equipment (MTOE) requirements. The exception to this is the RQ-11B Raven where the number of trained personnel is at the discretion of the owning Commander. The numbers included in this document for Raven are the minimum required.

	MQ-1C	MQ-5B	RQ-7B	RQ-11B	Total
15E Operator	92	57	1307	N/A	1456
15W Mechanic	52	33	733	N/A	818
150U Warrant	20	12	168	N/A	200
Total	164	94	2208	3596	

Table 5: Current Manpower Requirements

	MQ-1C	MQ-5B	RQ-7B	RQ-11B	Total
15E Operator	552	57	1448	N/A	2057
15W Mechanic	312	33	828	N/A	1173
150U Warrant	120	12	184	N/A	316
Total	984	94	2460	4614	

Table 6: FY 2015 Manpower Requirements

Due to the rapid growth of the Army UAS fleet, all three of these MOS have been stressed to maintain pace with demand. To ensure wartime requirements are met, the Army has prioritized the distribution of UAS personnel to units preparing to deploy, followed by new unit fielding and then other units. This prioritization has allowed the Army to meet wartime requirements with well-trained and integrated units.

Navy

The Navy is currently conducting strategic planning for the long term manpower required to operate and maintain its UAS.

Vertical Take Off and Landing Tactical Unmanned Aerial Vehicle (VTUAV)-Littoral Combat Ship (LCS): Detachments that operate from the LCS are known as composite Aviation Detachments (AvDets). These composite AvDets operate and maintain both the MH-60R or MH-60S and one or two MQ-8B Fire Scout aircraft. This minimally manned (4

officers, 19 enlisted) detachment structure cannot be split to operate the different aviation platforms independently. Therefore, the UAS portion of LCS composite AvDet manning is not separate from traditional helicopter manning.

The MH-60/VTUAV composite AvDets will support all LCS seaframes with a 3:3:1 rotation. Under the 3:3:1 plan, three aviation detachments of personnel will use three AvDets to support one LCS deployment. One AvDet will be deployed, one AvDet will be completing training requirements as it prepares to deploy, and one AvDet will be conducting turnover and upkeep training to maintain aviation proficiency having recently returned from a deployment.

At the completion of the fleet response training plan (FRTP) cycle, personnel will return to their squadrons for further assignment, in accordance with the squadron's detachment loading, while MQ-8B airframes will be returned to the Contract Logistics Site (CLS) base. Personnel will be managed within squadrons to ensure operational exposure and experience is gained in both manned and unmanned assignments to enable a quality spread of personnel, and to attain personal career progression milestones. This will promote VTUAV community integration and ensure the community has a flexible manpower base to draw upon when supporting various detachment configurations.

VTUAV-Special Operations Forces (SOF) ISR: Navy is evaluating the manning structure needed to provide a VTUAV-only aviation detachment. The leading proposal is to develop unmanned detachments, or "UDets" from HQU-10, the VTUAV fleet replacement squadron. Nine detachments would be needed to support three constantly deployed UDets, totaling approximately 336 additional personnel. Alternately, a separate expeditionary VTUAV squadron could be organized to perform the same function but at higher personnel cost due to the lack of synergy with an existing unit.

BAMS: Personnel that will operate and maintain the MQ-4C BAMS will transition from the existing Maritime Patrol (P-3C Orion) community. The existing community will transition from the P-3C to the P-8A Poseidon and the MQ-4C. At full operational capability in FY 2020, it is estimated that 866 personnel will be needed for five worldwide BAMS orbits.

Marine Corps

U.S. Marine Corps (USMC) Shadow and STUAS: Three active-duty and one reserve-duty Marine Unmanned Aerial Vehicle (VMU) squadrons are manned at or near the required Table of Organization (T/O) manning level of 193 Marines and Sailors. Each VMU is comprised of a headquarters element (40 personnel) and three individual RQ-7B detachments, each comprised of 51 Marines. Each RQ-7B detachment is capable of independent operations, and contains all necessary intelligence, communications, flight operations, and maintenance personnel. In 2012, an additional 81 Marines to support nine RQ-21A STUAS systems will begin arriving at each active-duty VMU squadron. Each RQ-21A STUAS detachment will contain nine Marines and be capable of independent UAS flight operations with required host unit support.

SECTION 3 – ***Current and planned UAS basing and other operating locations:***

The rapid increase in fielded UAS has created a strong demand for access within the NAS and international airspace. The demand for airspace to test new systems and train UAS operators has quickly exceeded the current airspace available for these activities. Figure 1 below shows the projected number of DoD UAS locations in the next 6 years, many without access to airspace compatible for military operations under the current regulatory environment.

Figure 1: Representative DoD UAS Locations by 2017

NAS access for UAS is currently limited primarily due to regulatory compliance issues and interim policies. DoD UAS operations conducted outside of restricted, warning, and prohibited areas are authorized only under a (temporary) COA from the FAA. The COA process is adequate for enabling a small number of flights but does not provide the level of airspace access necessary to accomplish the wide range of DoD UAS missions at current and projected operational tempos (OPTEMPOs). This constraint will only be exacerbated as combat operations shift from abroad and systems return to U.S. locations.

If DoD UAS do not have direct access to Restricted and Warning Areas (e.g., airfield located within a restricted area), a COA is required. Obtaining a COA requires a significant amount of time and resources – both to complete an application and to work through the FAA approval process. The Military Departments currently have 88 active COAs at various locations around the country, most of which provide access to a restricted or warning area. Many restricted areas are small in size and will only accommodate a smaller sized UAS.

Table 7 lists the Departments' 110 potential UAS basing locations and the UAS likely to fly at that location.

LOCATION	SERVICE	UAS
ALABAMA		
Fort McClellan	ARNG	RQ11B
	ARNG	RQ7B
Redstone	USA	RQ11B
	USA	RQ7B
ALASKA		
Fort Greely	USA	RQ11B
	USA	RQ7B
Fort Richardson	USA	RQ11B
	USA	RQ7B
Fort Wainwright	USA	RQ11B
	USA	RQ7B
ARIZONA		
Cochise College	USA	MQ5
Florence	ARNG	RQ11B
Fort Huachuca	USA	MQ1B
	USA	MQ1C
	USA	MQ5
	USA	RQ7B
	USMC	RQ7B
	USMC	RQ21A
MCAS Yuma	USMC	RQ7B
	USMC	RQ21A
Whetstone	ARNG	RQ7B
Yuma Proving Ground	USN	MQ8
ARKANSAS		
Fort Chaffee	ARNG	RQ11B
	ARNG	RQ7B
Little Rock	ARNG	RQ11B
CALIFORNIA		
Beale AFB	USAF	RQ4 *
	USN	RQ4A BAMS
Camp Morena	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Wasp
NAWS China Lake	USN	MQ8
Camp Roberts	ARNG	RQ11B
	ARNG	RQ7B
	USSOCOM	Scan Eagle
El Mirage	USA	MQ1B

LOCATION	SERVICE	UAS
	USA	MQ1C
Filmore	USA	Wasp
Filmore	USA	PUMA AE
	USSOCOM	Wasp
	USSOCOM	Puma AE
Fort Irwin	USA	RQ11B
	USA	RQ7B
Gray Butte	USAF	MQ1B
	USAF	MQ9A
MCAGCC 29 Palms	USMC	RQ-11B
	USMC	RQ-7B
	USMC	Scan Eagle
	USMC	RQ21A
MCB Camp Pendleton	USMC	RQ-11B
NAS Lemoore	USN	UCLASS
Pt Mugu	USN	MQ8
San Clemente Island	USA	RQ11B
	USSOCOM	MQ1B
	USSOCOM	MQ9A
SCLA Victorville	ANG	MQ1B
	USA	YMQ-18A
	USSOCOM	A160
	USSOCOM	RQ11B
SSTC, Imperial Beach	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Wasp
Simi Valley	USA	RQ11B
	USSOCOM	PUMA AE
	USSOCOM	Wasp
Vandenberg AFB	USSOCOM	RQ11B
COLORADO		
Fort Carson	USA	RQ11B
	USA	RQ7B
	USSOCOM	MQ1B
	USSOCOM	MQ9A
Pinon Canyon	USA	RQ11B
	USSOCOM	RQ7B
USAF Academy	USAF	Aerosonde
	USAF	Rascal
	USAF	Alpha 60
FLORIDA		
Appalachicola	USSOCOM	Wasp

LOCATION	SERVICE	UAS
	USSOCOM	Raven
	USSOCOM	Puma AE
Archer Field	USAF	Wasp
	USAF	MAV
Avon Park	USSOCOM	MQ1B
	USSOCOM	MQ9A
Homestead	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Wasp
Hurlburt Fld	USSOCOM	MQ1B
	USSOCOM	MQ9A
	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Wasp
NAS Jacksonville	USN	RQ4 Blk10
NOLF Choctaw	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Scan Eagle
	USSOCOM	Wasp
NS Mayport	USN	MQ8
Starke	ARNG	RQ11B
	ARNG	RQ7B
GEORGIA		
Fort Benning	USA	RQ11B
	USA	RQ7B
	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Viking
	USSOCOM	RQ7B
Fort Stewart	USA	MQ5
	USA	RQ11B
	USA	RQ7B
	USA	MQ1C
	USSOCOM	MQ1B
	USSOCOM	MQ9A
Hunter AAF	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	RQ7B
	USSOCOM	Viking
HAWAII		
Kaneohe Bay	USMC	RQ-11B
	USMC	RQ-7B
Wheeler	USA	RQ11B
	USA	RQ7B
IDAHO		
Boise	ARNG	RQ11B
	ARNG	RQ7B
ILLINOIS		
Havana Airport	ARNG	RQ7B
Ipava	ARNG	RQ11B
INDIANA		
Camp Atterbury	ARNG	RQ11B
	ARNG	RQ7B
Jefferson Range	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	RQ7B
	USSOCOM	Viking
KANSAS		
Fort Riley	USA	RQ11B
	USA	RQ7B
	USA	MQ1C
KENTUCKY		
Corbin	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Wasp
Fort Campbell	USA	RQ11B
	USA	RQ7B
	USA	MQ1C
	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	RQ7B
	USSOCOM	Viking
Fort Knox	USA	RQ11B
	USA	RQ7B
Lexington	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Wasp
LOUISIANA		
Camp Claiborne	ARNG	RQ7B
Fort Polk	ANG	MQ1B
	USA	RQ11B
	USA	RQ7B
	USSOCOM	MQ1B
	USSOCOM	MQ9A
MARYLAND		
NAS Patuxent	USN	RQ4 Blk10
	USN	RQ4A BAMS
	USN	MQ4C BAMS

LOCATION	SERVICE	UAS
	USN	MQ8
	USN	UCAS-D
	USN	UCLASS
	USMC	RQ-7B
Webster Outlying Field	USN	MQ8
	ARNG	RQ7B
MASSACHUSETTES		
Camp Edwards	ARNG	RQ11B
MICHIGAN		
Camp Grayling	ARNG	RQ11B
	ARNG	RQ7B
Lake Margretha	ARNG	RQ11B
MINNESOTA		
Camp Ripley	ARNG	RQ11B
	ARNG	RQ7B
MISSISSIPPI		
Camp Shelby	ARNG	RQ11B
	ARNG	RQ7B
Stennis Space Center	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Wasp
MISSOURI		
Fort Leonardwood	USA	RQ11B
NEVADA		
Creech AFB	USAF	MQ1B
	USAF	MQ9A
	USSOCOM	MQ9A
Desert Rock Airstrip	USSOCOM	Puma
NEW JERSEY		
Warren Grove	ARNG	RQ7B
NEW MEXICO		
Albuquerque	USA	Wasp
Cannon AFB	USSOCOM	MQ1A
	USSOCOM	MQ9A
	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Wasp
Holloman AFB	USAF	MQ1B
	USAF	MQ9A
Playas	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Wasp
	USA	RQ11B
White Sands	USSOCOM	MQ1B

LOCATION	SERVICE	UAS
	USSOCOM	MQ9A
	USSOCOM	RQ7B
NEW YORK		
Fort Drum	ANG	MQ9A
	USA	RQ11B
	USA	RQ7B
Seneca	ARNG	RQ11B
NORTH CAROLINA		
MCB Camp Lejune	USMC	RQ11B
	USMC	RQ21A
	USSOCOM	RQ11B
	USSOCOM	Wasp
	USMC	RQ21A
Fort Bragg	USA	RQ11B
	USA	RQ7B
	USA	MQ1C
	USSOCOM	MQ1B
	USSOCOM	MQ9A
	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	RQ7B
	USSOCOM	Viking
	USSOCOM	Wasp
MCALF Bogue	USMC	RQ7B
	USMC	RQ21A
MCAS Cherry Point	USMC	RQ7B
	USMC	RQ21A
NORTH DAKOTA		
Devils Lake	ARNG	RQ11B
Grand Forks AFB	ANG	MQ1B
	USAF	RQ4 Blk40
OHIO		
Lacarne	ARNG	RQ11B
Wright Patterson AFB	USAF	Wasp
	USAF	RQ11B
OKLAHOMA		
Camp Gruber	ARNG	RQ11B
Fort Sill	ARNG	RQ11B
	ARNG	RQ7B
OREGON		
Boardman Range	ARNG	RQ7B
Camp Rilea	USSOCOM	Wasp
Portland	USSOCOM	PUMA AE
	USSOCOM	RQ11B

LOCATION	SERVICE	UAS
	USSOCOM	Wasp
Salem	ARNG	RQ11B
PENNSYLVANIA		
Fort Indiantown Gap	ARNG	RQ11B
	ARNG	RQ7B
SOUTH CAROLINA		
Charleston	USN	WASP III
North Aux Field	USSOCOM	RQ7B
	USSOCOM	Puma AE
TENNESSEE		
Savannah	USSOCOM	Scan Eagle
TEXAS		
Brownsville	ARNG	RQ11B
Fort Bliss	USA	RQ11B
	USA	RQ7B
	USA	MQ1C
Fort Hood	USA	MQ5
	USA	RQ11B
	USA	RQ7B
	USA	MQ1C
	USMC	RQ7B
	USMC	RQ21A
	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	RQ7B
Fort Worth	ARNG	RQ11B
Gatesville	USSOCOM	Viking
UTAH		
Camp Williams	ARNG	RQ11B
	ARNG	RQ7B
Dugway	USA	MQ1B
	USA	MQ5
	USA	RQ7B
VIRGINA		
Fort Pickett	USSOCOM	Viking
	ARNG	RQ11B
	ARNG	RQ7B
Fort Story	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Scan Eagle
	USSOCOM	Wasp
Fort AP Hill	ARNG	RQ11B
	ARNG	RQ7B
Fort Eustis	USA	RQ11B
MCB Quantico	USMC	RQ-11B
	USMC	Wasp
	USMC	RQ21A
NALF Fentress	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Wasp
	USSOCOM	S100
WASHINGTON		
Fort Lewis	USA	RQ11B
	USA	RQ7B
McChord AFB	USSOCOM	PUMA AE
	USSOCOM	RQ11B
	USSOCOM	Wasp
Yakima Training	ARNG	RQ7B
	USSOCOM	MQ1B
	USSOCOM	MQ9A
WISCONSIN		
Fort McCoy	ARNG	RQ11B
	ARNG	RQ7B
Camp Douglas	ANG	RQ7B
WYOMING		
Camp Guernsey	ARNG	RQ11B
GUAM		
Anderson AFB	USAF	RQ4
	USMC	RQ7B
	USMC	RQ21A
PUERTO RICO		
Salinas	ARNG	RQ11B
OCEANIC		
Worldwide Oceanic	USN	MQ8

Table 7: Planned DoD UAS Locations by State/Territory

* *Only block 20/40 RQ-4B aircraft remain at Beale AFB after FY 2013 budget is authorized (Block 30s cancelled).*

SECTION 4 – ***Progress made in providing the number of facilities needed for UAS inventories to support operations and training and the funding required for any additional facilities:***

Past, current, and future MILCON projects necessary to support UAS operations and training are presented by each of the Military Departments below:

Air Force

The Air Force UAS MILCON chart (Table 8: Air Force UAS MILCON Projects) shows past, current, and future MILCON projects supporting MQ-1, MQ-9, and RQ-4 UAS funded by the FY 2012 President's Budget.

Additional Air Force Special Operations Command (AFSOC) MILCON includes: a $30.4-million SOF RPA Hangar/AMU Facility at Cannon Air Force Base to replace Hangar 119 and $1.95 million to beddown the 2nd Special Operations Squadron (SOS) once a final location is determined.

FY	MAJCOM	LOCATION	TITLE	Program Amount ($K)	STATUS
2003	ACC	BEALE	GLOBAL HAWK SQUADRON OPERATIONS/MAINTENANCE FACILITY	$3,670	HIS[1]
2003	ACC	BEALE	GLOBAL HAWK UPGRADE MAINTENANCE DOCK	$4,600	HIS[1]
2003	ACC	BEALE	GLOBAL HAWK DINING FACILITY	$3,470	HIS[1]
2004	ACC	CREECH	PREDATOR SQUADRON OPERATIONS/AMU/HANGAR	$25,731	HIS[1]
2004	ACC	BEALE	GLOBAL HAWK UPGRADE DOCKS	$8,958	HIS[1]
2004	ACC	BEALE	GLOBAL HAWK DORMITORY (144 RM)	$14,609	HIS[1]
2005	ACC	CREECH	PREDATOR MAINTENANCE COMPLEX	$27,108	CMP[2]
2005	ACC	BEALE	GLOBAL HAWK UPGRADE DOCK 2	$8,320	HIS[1]
2005	ACC	BEALE	GLOBAL HAWK ADDITION TO AGE FACILITY	$1,866	HIS[1]
2006	ACC	CREECH	PREDATOR OPERATIONS FACILITIES	$23,081	CMP[2]
2006	ACC	CREECH	PREDATOR MAINTENANCE AND LOGISTICS COMPLEX	$19,067	CMP[2]
2006	ACC	CREECH	PREDATOR MUNITIONS COMPLEX	$9,237	CMP[2]
2006	ACC	CREECH	PREDATOR TRAINING FACILITIES	$8,732	CMP[2]
2006	ACC	BEALE	GLOBAL HAWK TWO BAY MAINTENANCE HANGAR	$14,058	HIS[1]
2007	ACC	CREECH	PREDATOR VARIOUS FACILITIES	$26,000	CNS[3]
2007	ACC	CREECH	PREDATOR VARIOUS FACILITIES	$23,923	CMP[2]
2007	PACAF	ANDERSEN	GLOBAL HAWK AIRCRAF MAINTENANCE AND OPERATIONS COMPLEX	$52,800	CMP[2]

2007	ANG	MARCH, CA	PREDATOR OPERATIONS & TRAINING COMPLEX	$6,000	CMP[2]
2007	ANG	HECTOR, ND	PREDATOR OPERATIONS COMPLEX	$5,500	CMP[2]
2007	ANG	ELLINGTON, TX	PREDATOR OPERATIONS COMPLEX	$6,000	CMP[2]
2008	ACC	GRAND FORKS	BRAC - CONVERT HANGAR FOR UAV CORROSION CONTROL	$1,280	HIS[1]
2009	ACC	CREECH	UAS OPS FACILITY	$16,145	CNS[3]
2009	ACC	CREECH	UAS DINING HALL	$7,579	CMP[2]
2009	ACC	CREECH	UAS FLIGHT SIM & ACADEMICS FACILITY	$9,127	CNS[3]
2009	ACC	CREECH	UAS 432 WING HQ MISSION SPT FACILITY	$7,000	CMP[2]
2009	ACC	CREECH	UAS MAIN GATE/SEWER TRANSFER STATION INFRASTRUCTURE	$6,500	CNS[3]
2009	ANG	HANCOCK, NY	TFI-REAPER IOC/FOC	$5,000	CMP[2]
2010	ACC	NAS SIGONELLA	GLOBAL HAWK AIRCRAFT MALNT AND OPS COMPLEX	$31,300	CNS[3]
2010	ACC	HOLLOMAN	UAS FTU COMPLEX	$37,500	CNS[3]
2010	ANG	DAVIS-MONTHAN, AZ	TFI-PREDATOR BEDDOWN – FOC	$5,600	CNS[3]
2010	ANG	S. CALIF LOG APT, CA	TFI-PREDATOR LRE BEDDOWN	$8,400	CNS[3]
2010	ANG	FT DRUM, NY	TFI-REAPER LRE BEDDOWN	$2,700	DSG[4]
2011	AFSOC	CANNON	UAS SQUADRON OPS FACILITY	$20,000	DSG[4]
2011	ACC	HOLLOMAN	UAS ADD/ALTER MAINTENANCE HANGAR	$15,470	DSG[4]
2011	ACC	HOLLOMAN	UAS MAINTENANCE HANGAR	$22,500	DSG[4]
2011	ACC	CREECH	UAS AIRFIELD FIRE/CRASH RESCUE STATION	$11,710	RTA[5]
2011	USAFE	RAMSTEIN	UAS SATCOM RELAY PADS AND FACILITY	$10,800	DSG[4]
2011	ANG	DAVIS-MONTHAN, AZ	TFI - PREDATOR FOC - INCREASED ORBITS	$4,650	DSG[4]
2011	ANG	FORT HUACHUCA, AZ	TFI-PREDATOR LRE BEDDOWN	$11,000	DSG[4]
2011	ANG	FT DRUM, NY	TFI - REAPER INFRASTRUCTURE	$2,500	DSG[4]
2011	ANG	ELLINGTON, TX	TFI-ALTER UAV HANGAR	$7,000	DSG[4]
2012	ACC	SIGONELLA NAVAL AS	UAS SATCOM RELAY PADS AND FACILITY	$15,000	DSG[4]
2012	ANG	SPRINGFIELD, OH	ALTER PREDATOR OPERATIONS CENTER	$6,700	DSG[4]
2013	ACC	UNSPECIFIED	MQ-9 PLANNING AND DESIGN	$314	
2013	ACC	UNSPECIFIED	MQ-9 REAPER FACILITIES	$47,750	
2014	ANG	TBD	PREDATOR OPERATIONS CENTER	$10,200	

Table 8: Air Force UAS MILCON Projects

Table Notes:

1. Historical (HIS)
2. Complete (CMP)
3. Construction (CNS)
4. Design (DSG)

5. Ready To Advertise (RTA) (Contracting Package is Ready for Bidding/Solicitation)

Army

The Army UAS MILCON listed below shows current and future MILCON projects supporting MQ-1C, MQ-5B, RQ-7B and RQ-11B that are funded through the FY 2012 President's Budget.

MQ-1C Gray Eagle: The Gray Eagle system will be stationed at existing Army Airfields. Table 9: MQ-1C Gray Eagle MILCON) describes the budget for 14 of the 17 Companies (last three Companies are outside the current MILCON funding window). Each of the identified hangars will house up to three Companies of Gray Eagles.

LOCATION	*BUILDING*	*BUDGET*
Fort Huachuca (Schoolhouse)	1 Hangar	FY 201: $10 million
Fort Hood	2 Hangars	FY 2011: $55 million; FY 2012: $45 million
Fort Riley	1 Hangar	FY 2012: $68 million
Fort Stewart	1 Hangar	FY 2011: $47 million; FY 2013: $20 million
Fort Bragg	1 Hangar	FY 2012: $72 million
Fort Campbell	1 Hangar	FY 2012: $68 million

Table 9: MQ-1C Gray Eagle MILCON

MQ-5B Hunter: No new facilities are planned as all three Companies and the training units are already fielded.

RQ-7B Shadow: There are no unit-specific facilities planned for the Shadow Platoon as the system is a subordinate unit whose maintenance and storage facilities are part of their parent company's Tactical Equipment Maintenance Facility. To improve training and reduce maintenance, the Army will prepare field sites in local training areas that are dedicated for the Shadow UAS. The field site facility includes a 1000-foot-by-50-foot paved landing strip and adjacent support building. The building is a rudimentary structure (3200 square feet) to support Shadow sustainment, provide shelter from adverse weather, and secure the platforms. The concept is for units to occupy the facility on a temporary basis and schedule it as they would a range or training area. It enables launch and recovery under the veil of the installation's restricted airspace and greatly reduces system damage risks during training. Landing strips are funded in FY 2012 for Fort Bragg, Fort Drum, Fort Bliss, Fort Carson, Fort Lewis, Yakima Training Center, Fort Riley; and, in FY 2013, for AP Hill, Atterbury, Fort Chaffee, Fort Dix, Fort Indian Gap, Knox, Korea, Fort McCoy, Orchard Training Area, Fort Richard, Fort Pickett, Camp Ripley, Camp Roberts, and Camp Shelby.

RQ-11B Raven: Due to its small size, dedicated UAS facilities are not required for this system.

Navy

RQ-4A Broad Area Maritime Surveillance Demonstrator (BAMS D): BAMS D aircraft are launched and recovered from a Forward Operating Base (FOB) in the U.S. Central Command (USCENTCOM) and return to NAS Patuxent River, MD, for periodic maintenance. Facilities for BAMS D are temporary in nature (occupying available hangar space at Patuxent River). Following the declaration of initial operating capability of BAMS, the BAMS D UAS are planned to be returned to the tenant command (NAS Patuxent River) for retirement.

MQ-4C BAMS: Table 10: Navy UAS MILCON Projects) shows current and future MILCON projects that are funded by the FY 2012 President's Budget. Additional Navy MILCON is planned outside the FYDP to support continued establishment of UAS capability.

When production commences in FY 2013, BAMS aircraft will initially be located at NAS Patuxent River, MD, for testing. The first two orbits in USCENTCOM and U.S. Pacific Command (USPACOM)will be established with aircraft located OCONUS in FY 2016 and FY 2017. BAMS training and maintenance facilities are currently planned at Beale AFB, CA, and at Main Operating Bases (MOB) NAS Jacksonville, FL, and NAS Whidbey Island, WA. Additionally, FOBs are planned for Andersen AFB, Guam, and NAS Sigonella, Sicily, and at a location in USCENTCOM.

A BAMS UAS test facility is currently under construction at NAS Patuxent River with a completion date of October 2012. Designs are complete for the BAMS Mission Systems Operator training facility at NAS Jacksonville, and construction will begin upon receipt of FY 2012 funding. Three additional projects – USCENTCOM FOB site, BAMS Mission Control Systems Facility at NAS Jacksonville MOB, and BAMS Maintenance Training Facility at Beale AFB – are in the contracting and development process for FY 2013 funding. BAMS' initial USCENTCOM FOB site location is pending host nation notification.

FY	MAJCOM	LOCATION	TITLE	Program Amount ($K)	STATUS
2011	NAVAIR	PATUXENT RIVER	BAMS TEST HANGAR FACILITY	$33,304	CNS[1]
2012	FFC	JACKSONVILLE	BAMS MISSION SYSTEMS OPERATOR TRAINING FACILITY	$4,482	DSG[2]
2013	FFC	JACKSONVILLE	BAMS MAIN OPERATING BASE MISSION CONTROL SYSTEMS FACILITY	$24,660	
2013	USCENTCOM	VARLOC MIDDLE EAST	BAMS FORWARD OPERATING BASE FACILITIES	$35,900	
2013	FFC	BEALE	BAMS MAINTENANCE TRAINING FACILITY	$17,370	
2014	USPACOM	GUAM	BAMS FORWARD OPERATING BASE	$76,139	
2015	FFC	WHIDBEY ISLAND	BAMS MAIN OPERATING BASE MISSION CONTROL SYSTEMS FACILITY	$28,130	

FY	MAJCOM	LOCATION	TITLE	Program Amount ($K)	STATUS
2015	USEUCOM	SICILY	BAMS FORWARD OPERATING BASE FACILITIES	$29,730	
2015	FFC	BEALE	BAMS MAINTENANCE HUB HANGAR FACILITIES	$50,983	
2016	FFC	BEALE	BAMS FORWARD OPERATING BASE FACILITIES	$35,224	

Table 10: Navy UAS MILCON Projects

Table Notes:
1. Construction (CNS)
2. Design (DSG)

MQ-8B VTUAV-LCS: VTUAV will leverage existing MH-60 support infrastructure as it will also be supporting LCS requirements. Since LCS composite AvDets will normally have the UA only when supporting an LCS, squadrons will not require ramp or hangar space in support of the MQ-8B.

MQ-8B VTUAV – SOF ISR: HQU-10, located onboard NAS North Island, CA, has been identified as the fleet replacement squadron for VTUAV training. No new construction is envisioned to meet VTUAV training requirements.

Unmanned Carrier-Launched Surveillance and Strike (UCLASS): UCLASS air vehicle basing and testing locations have not been selected at this time since the system is pre-milestone A.

USMC

RQ-7B Shadow and RQ-21A STUAS: VMU-1 and VMU-3 are currently based at Marine Corps Base Twenty-Nine Palms, CA. All active-duty VMU squadrons are currently housed in existing facilities that have been modified to support VMU squadron activity. MILCON construction contracts to support the VMU-3 move to Hawaii and the planned VMU-4 move to Camp Pendleton are either in place or pending.

SECTION 5 – ***The availability of airspace, ranges, and other infrastructure at each planned UAS location, and a description of the steps that the services plan to take to overcome any limitations that adversely impact UAS training:***

Over the past several years, UAS have become a transformational force multiplier for DoD. The numbers and roles of UAS have expanded dramatically to meet mission demands, and operational commanders have come to rely upon robust and persistent ISR support from unmanned platforms executing their core missions against hostile forces. DoD UAS require routine NAS access in order to execute operational, training, and support missions and to support broader military and civil demands. UAS will not achieve their full potential military utility unless they can go where manned aircraft go with the same freedom of navigation, responsiveness, and flexibility.

As theater forces return and the Military Departments' UAS fleets expand, DoD will require comprehensive continuation and Joint force training in the peacetime environment. Failure to prepare for this eventuality will result in a loss of combat gained experience. As UAS have matured and acquisition programs of record have emerged in all Military Departments, a concerted effort has been made to ensure, wherever practical and possible, that the Departments share logistics costs and burdens to include training and training systems. Below, each Military Department describes planned UAS basing locations and any mitigation plans for adversely impacted UAS training.

U.S. Air Force (USAF)

Each CONUS location that has plans to base MQ-1, MQ-9, or RQ-4 aircraft is listed below with an associated assessment of range and airspace availability.

Beale AFB (RQ-4): Beale AFB currently operates the CONUS-based AF fleet of RQ-4s. Operation from Beale is conducted under a COA issued by the FAA allowing the aircraft to climb into Class A airspace above Flight Level (FL) 180 and transit to operational locations.

Creech AFB (MQ-1 & MQ-9): Creech AFB is located under the restricted airspace of the Nevada Test and Training Range (NTTR), one of the Air Force's largest and most capable range complexes. Other operations from Creech are conducted under FAA-issued COAs, primarily for MQ-1/9 flights within the Creech AFB traffic pattern in Class D airspace, and for transits to restricted airspace in CA (R-2508) and the Utah Test and Training Range.

Holloman AFB (MQ-1 & MQ-9): An FAA COA is required to utilize runways at Holloman AFB that are not within restricted airspace. A COA is also required to allow MQ-1/9 access to Restricted Area R-5103 B/C southeast of Holloman AFB in order to transit airspace that is not restricted.

Cannon AFB (MQ-1 & MQ-9): RPAs transiting from Cannon AFB to their training location at the Melrose Range operate under an FAA COA requiring ground observers to follow the aircraft when not in restricted airspace.

March ARB/SoCal Logistics Airport (MQ-1 & MQ-9): An FAA COA requires chase aircraft to escort RPAs from Southern California Logistics Airport (formerly George AFB) to the R-2508 Complex associated with Edwards AFB, NAS China Lake, and Fort Irwin.

Fort Drum (MQ-9): The MQ-9 RPAs associated with the Syracuse Air National Guard (ANG) will be based at Fort Drum, NY. Fort Drum is located under the restricted airspace of the Adirondack Range Complex. An FAA COA is required to allow MQ-9 Reaper launch and recovery at Wheeler Sack Army Airfield in order to transit from military Class D airspace to and from the Misty Airspace Complex and the Adirondack Air Traffic Control Assigned Airspace (ATCAA).

Grand Forks (RQ-4, MQ-1 & MQ-9): Chase aircraft or visual observers are required by FAA to mitigate the RPA/UAS lack of a see/sense and avoid capability. In the case of Southern California Logistics Airport (formerly George AFB), no restricted airspace is available for RPAs to operate or transit to R-2508; while at Grand Forks, an airspace proposal has been submitted to establish restricted airspace to support UAS operations west of Grand Forks AFB. RPA operations beyond the Grand Forks AFB traffic pattern are limited until the airspace proposal is approved and charted by the FAA and a supporting COA is developed.

Remote Split Operations (RSO) only: MQ-1 & MQ-9 operations at Ellsworth AFB, SD, and Whiteman AFB, MO, will not have aircraft assigned to their location.

The USAF will require additional airspace access for UAS operations. The current NAS access does not support developmental Sense and Avoid objectives, nor will it support projected training requirements. Without improved NAS access and improved access to special use airspace (SUA), the capabilities of the USAF UAS force will stagnate or degrade, reducing the USAF overall mission effectiveness.

As the UAS force expands and resets from overseas deployments, the demand for airspace or airspace access will increase. Defense Base Realignment and Closure (BRAC) Commission actions and force restructuring have presented an immediate need for suitable testing and training airspace. While the USAF maintains that exclusionary SUA must remain an interim solution, it is not the preferred option due to the lengthy rulemaking process. Consequently, the USAF adamantly supports exploration of all less exclusionary alternatives (e.g., special security instruction airspace, alert areas, terminal radar service areas, Mode C veil over a military operations areas, Federal Aviation Regulation Part 93: Special Air Traffic Rules and Airport Traffic Patterns) that alone or combined with current technology, provide a means to support near-term AF test and training airspace requirements. These interim airspace measures provide immediate improved NAS access, while USAF and FAA work together towards viable long-term and routine sense-and-avoid solutions without undue burden on other NAS stakeholders.

The USAF will limit requests for additional SUA to that required to support combat readiness and only when less exclusionary airspace options are not available or practical.

The USAF is committed to maintaining the safety of the NAS and minimizing impact on civil users while working towards full UAS NAS integration.

Army

The Army has more than 1,800 UAS that are embedded in maneuver units from Platoon through Corps echelons. Army UAS are found at nearly all Army installations. The larger systems, Hunter and Gray Eagle, operate from Army airfields. Shadow UAS launch and recover predominately from field sites located in the local training areas. The hand-launched Raven requires no prepared location from which to conduct operations. For peacetime training, all of these systems operate primarily inside the confines of a military restricted airspace in support of ground maneuver units.

Army UAS have similar operational challenges as other manned aviation platforms such as adequate airspace to maneuver, realistic range targets and sufficient bed down locations. UAS also have the additional limitation of spectrum availability. Of these challenges, spectrum is the most limiting and requires close coordination between all spectrum users to ensure sufficient numbers of frequency sets are available to conduct training. The Army has continued to modernize existing UAS data links in an effort to become more bandwidth efficient; two examples of this are the Digital Data Link (DDL) for the small UAS and the Tactical Common Data Link (TCDL) for Shadow and larger systems. With both data links, modernization allows for more aircraft to operate in the same amount of bandwidth.

While the Army has significant numbers of UAS deployed to combat operations, their return at the end of hostilities will not have a significant negative impact on training. Similar to other Army assets (manned aviation, artillery, ground maneuver units), these units must prioritize and deconflict their requirements for range resources.

Table 11 Locations Requiring COAs) lists the locations where the Army currently conducts operations outside of Restricted Areas that require a COA from the FAA. In the majority of these locations, the purpose of the COA is to transition from the launch site to adjacent Restricted Areas. Additionally, the Raven can be operated using DoD-FAA agreed-to Class G airspace notification procedures for flights flown over Government-owned or -leased land.

MQ-1C		RQ-7B SHADOW	
Fort Huachuca	AZ	Fort Greeley (Allen AAF)	AK
El Mirage/Grey Butte	CA	Fort Richardson (Bryant AAF)	AK
MQ-5 HUNTER		Fort Wainwright (Husky DZ)	AK
Cochise College	AZ	Redstone Arsenal	AL
Fort Stewart	GA	Whetstone	AZ
Fort Hood	TX	Camp Roberts	CA
RQ-11B Raven (Class G Notification)		Fort Stewart	GA
Fort Wainwright	AK	Wheeler AAF	HI
Simi Valley	CA	Havana	IL
Piñon Canyon	CO	Fort Knox	KY
Ipava	IL	Fort Polk	LA
RQ-11B Raven (Continued)		**RQ-7B Shadow (Continued)**	
Ft Polk	LA	Camp Grayling	MI
Seneca	NY	Camp Ripley	MN
Camp Gruber	OK	Camp Shelby	MS
Salem	OR	Fort Drum	NY
Brownsville	TX	Ft Sill	OK
Camp Bowie	TX	Fort Indiantown Gap	PA
Camp Swift	TX	Ft Bliss	TX
Yakima Training Center	WA	Ft Hood	TX
		Fort A.P. Hill	VA

Table 11 Locations Requiring COAs

Additional efforts to accommodate home station UAS training beyond the Shadow down-range facilities include the following:

1. Targetry. Conventional training range targetry cannot adequately support UAS acquisition and engagement tasks as it is one-dimensional. To provide requisite targetry, the Army has provided targets that are either physical or digital, full-scale representations of the threat to installations. These targets also come with Digital Aviation Gunnery Ranges and Aviation Add-On Packages for existing digital ranges (Riley, Yakima, and Carson Digital Multipurpose Range Complexes). Three-dimensional targets are necessary to support target acquisition, designation, and engagement with captive training missiles.

2. Scoring. Crew tasks must be scored to ensure the laser is on the target and accurate in order to ensure effective Hellfire engagements. While live missiles will not be

fired from UAS platforms at home station, laser accuracy must be assessed to ensure precision targeting capabilities.

3. Urban Terrain. Mission challenges in the contemporary environment dictate the availability of urban terrain on home station ranges. To provide these venues, the Army has initiated and successfully enabled fielding of Air-Ground Integration (A-GI) villages. These villages provide 13 modular buildings and urban ballast on live fire ranges. A-GI villages are on the ground at Fort Drum, Fort Bragg, Fort Stewart, Fort Riley, Fort Hood, Fort Bliss, Pohakulua Training Area (HI) and Donnelly Training Area (AK). Further, villages will be fielded to the Yakima and Carson Digital Multi Purpose Range Complex (DMPRC). The Digital Air Ground Integration Range (DAGIR) includes A-GI villages. Units are currently using these villages for manned aerial platform crew qualification and collective A-GI training.

4. Airspace. Thorough analysis has been conducted to evaluate available restricted airspace at installations that support UAS platforms. The challenges can be broken down into two basic areas.

a. Adequate area to maneuver/train for each installation. This is the length, width, altitudes, and availability of restricted area airspace at the installation.

b. Adequate/established corridors from the installation's Army Airfield to its restricted airspace. While Raven and Shadow can be supported down range, Gray Eagle requirements dictate launch and recovery from Army Airfields with sufficient runways.

<u>Navy</u>

Navy UAS operator training for Fire Scout, BAMS and UCLASS is planned to be 100-percent simulation based. Fire Scout and BAMS aircraft will generally not be used to meet or maintain training and readiness except in early development before simulators are delivered. Between FY 2012 and FY 2014, Fire Scout training will involve flights at Webster Field. During underway training periods on board Navy ships, Fire Scout will operate in overland and overwater airspace appropriately cleared for UAS operations. Additionally, ship and Strike Group pre-deployment training will require UAS flights in Fleet training areas. Navy is working within the construct of the DoD UAS Airspace Integration Plan to ensure adequate airspace is available for this integrated training.

BAMS: Training for BAMS operators will be done via simulation, utilizing the same computer-based ground stations used to control BAMS. Use of high-fidelity simulation will limit the need to operate the aircraft to only ship and Strike Group integration training.

Regardless of operating location, CONUS or OCONUS, the MQ-4C Mission Control Station (MCS), along with its embedded Mission System Trainer (MST) only requires electrical power and basic infrastructure to provide full functionality for operations and training. Due to its integrated design, the MST does not require an aircraft (or any related

airspace, ranges, or flight-related logistic support) in order to provide fully representative operator training.

The Navy is actively engaged with the FAA to obtain COAs for future CONUS sites for BAMS. The current East Coast COA utilized for BAMS-D based from NAS Patuxent River will serve as a model for obtaining authorizations for other CONUS basing locations. With the final approval of CONUS basing sites by Fleet Forces Command, the program office will work with regional commanders and the FAA to obtain COAs to transit through the NAS.

UCLASS: The Navy is actively developing plans for UCLASS training and basing. Due to the immaturity of the program, final decisions have not yet been made.

Marine Corps

All USMC RQ-7B UAS operators (AVOs), maintainers, and unmanned aircraft commanders (UACs) are trained at the U.S. Army's Fort Huachuca, AZ, UAS Training Center under an Interservice Training Agreement in place since 2007.

Marine Corps RQ-7B initial AVO training is nearly identical to the U.S. Army's AVO curriculum and utilizes a combination of classroom instruction and RQ-7B simulator activities at Ft Huachuca. This initial instruction qualifies AVOs to the Joint Basic Unmanned Qualification (BUQ) Level 2[2].

USMC is reviewing a plan to send students for initial UAC training (for non-winged aviators) through the U.S. Air Force's RPA Pilot's flight and instrument qualification courses at Randolph Air Force Base in San Antonio, TX and Pueblo, CO. The USAF RPA Pilot's curriculum uses a combination of classroom instruction, flight simulation, and actual manned aircraft flight to train future UACs. This training will qualify the UACs up to BUQ Level 4.

Almost half of the USMC's RQ-7B Shadow's upper level training syllabus and most refresher training can be accomplished using RQ-7B simulators located at the VMU squadrons. The remainder of the training is conducted using the actual systems operating in support of USMC training events held within the FAA restricted areas that make up the MCB 29 Palms, CA, range complex, MCB Pendleton, the Yuma, AZ range complex, the NAS Fallon, NV range complex, and the MCB Camp Lejeune range complex.

The RQ-21A training syllabus and pipeline are currently under development by NAVAIR PMA 263/205 and the USMC's Training and Education Command (TECOM). It is expected that initially, RQ-21A AVOs and UACs will be drawn from the ranks of qualified RQ-7B operators.

Active FAA COAs allow the transit of VMU-2 aircraft through uncontrolled airspace from the MCAS Cherry Point class "D" surface area to the Restricted Area R5306C/D, and from the NAS Fallon class "D" surface area to the surrounding restricted areas. A ground based sense and avoid (GBSAA) solution is currently being evaluated by the FAA to support

[2] CJCS 3255.01, "Joint Unmanned Aircraft Systems Minimum Training Standards, July 17, 2009."

the 6 nm transit at Cherry Point. However, a network of 14 ground-based observers is still required to comply with the COA while the evaluation is ongoing.

USMC is actively engaged in its support to the overall DoD-coordinated efforts to shorten and simplify the FAA COA process in order to allow greater unmanned access to the NAS. To support this goal, USMC is pursuing a combination of technical solutions, such as a reliable GBSAA capability, and increased unmanned operator instrument flight training.

SUMMARY

DoD UAS have become a critical component of military operations. Many DoD UAS now require rapidly expanded access to the NAS and international civil airspace to support operations, training, testing, and broader governmental functions. In order for military aircraft to fly routinely in domestic and international airspace, the aircraft must be certified as airworthy, operated by a qualified pilot/operator in the appropriate class(es) of airspace, and comply with applicable regulatory guidance. DoD exercises sole certification authority for its aircraft and pilots/operators, consistent with authority provided in title 10, U.S. Code.

DoD's UAS NAS access methodology uses an incremental approach to provide DoD UAS critical access via given operations profiles prior to implementing a full dynamic operations solution. DoD's immediate focus is gaining near-term mission-critical access while simultaneously working toward far-term routine NAS access. DoD's airspace integration efforts will have positive affordability effects, such as eliminating the cost to study, analyze and complete a COA. Progress will be accomplished through policy and procedural changes, as well as technology and standards developments described in DoD's UAS Airspace Integration Plan. The end state will be routine NAS access comparable to manned aircraft for all DoD UAS operational, training, and support missions.

Additionally, the Office of the Deputy Assistant Secretary of Defense for Readiness, Directorate for Training Readiness and Strategy, is developing a comprehensive DoD UAS training strategy. The strategy will leverage the skills and expertise of each organization and build on foundational efforts already completed or being studied within the Military Departments. The study will investigate and assess the adequacy of existing and forecast joint, Military Department, and Combatant Commander UAS plans and programs that identify and describe qualification, continuation, and joint training requirements and CONOPS. The strategy will identify and describe individual, unit, and large force training requirements of all groups of UAS. The result will be a UAS Training Roadmap that guides UAS training shortfall and mitigation analyses, provides UAS training recommendations, and proposes investment considerations for the UAS community. The UAS Training Roadmap will serve as a companion piece to the "Unmanned Systems Integrated Roadmap" to provide guidance for efforts related to delivering UAS capabilities to the Warfighter. Phase one of the study will be complete in early 2012 and will serve to identify critical gaps in policy, guidance, and training concepts of operation.

ACRONYM LIST

AAF – ARMY AIRFIELD
ACC – AIR COMBAT COMMAND
AFB – AIR FORCE BASE
AFR – AIR FORCE RESERVE
AFRC – AIR FORCE RESERVE COMPONENT
AFSC – AIR FORCE SPECIALTY CODE
AFSOC – AIR FORCE SPECIAL OPERATIONS COMMAND
ANG – AIR NATIONAL GUARD
ARNG – ARMY NATIONAL GUARD
ATCAA – ADIRONDACK AIR TRAFFIC CONTROL ASSIGNED AIRSPACE
AVDET– AVIATION DETACHMENT
AVO – AIR VEHICLE OPERATOR
B – BASIC
BAMS – BROAD AREA MARITIME SURVEILLANCE
BAMS-D – BROAD AREA MARITIME SURVEILLANCE - DEMONSTRATOR
BRAC – DEFENSE BASE REALIGNMENT AND CLOSURE
BUQ – JOINT BASIC UNMANNED QUALIFICATION
CAP – COMBAT AIR PATROL
CCDR – COMBATANT COMMANDER
CENTCOM – CENTRAL AREA COMMAND
CLS – CONTRACT LOGISTICS SUPPORT
CMP – COMPLETE
CNS - CONSTRUCTION
COA – CERTIFICATE OF WAIVER OR AUTHORIZATION
COE – CENTER OF EXCELLENCE
CONOPS – CONCEPT OF OPERATIONS
CONUS – CONTINENTAL UNITED STATES
DAGIR – DIGITAL AIR GROUND INTEGRATION RANGE
DDL – DIGITAL DATA LINK
DMPRC - DIGITAL MULTI– PURPOSE RANGE COMPLEX
DOD – DEPARTMENT OF DEFENSE
DSG – DESIGN
FAA – FEDERAL AVIATION ADMINISTRATION
FLD – FIELD
FMS – FOREIGN MILITARY SALES
FOB – FOREIGN OPERATING BASE
FOC – FULL OPERATIONS CAPABILITY
FRTP – FLEET RESPONSE TRAINING PROGRAM
FT – FORT
FTU – FLIGHT TRAINING UNIT
FY – FISCAL YEAR
GBSAA – GROUND BASED SENSE AND AVOID
HIS – HISTORICAL
HQ – HEADQUARTERS
ISR – INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE
LCS – LITTORAL COMBAT SHIP
LRE – LAUNCH AND RECOVERY ELEMENT
MCAGCC – MARINE CORPS AIR GROUND COMBAT CENTER
MCALF – MARINE CORPS AUXILLIARY LANDING FIELD

MCAS – MARINE CORPS AIR STATION
MCB – MARINE CORPS BASE
MILCON – MILITARY CONSTRUCTION
MOB – MAIN OPERATING BASE
MOS – MILITARY OCCUPATION SPECIALTIES
MRMUAS – MEDIUM– RANGE MARITIME UNMANNED AERIAL SYSTEM
MST – MISSION SYSTEM TRAINER
MTOE – UNIT MODIFIED TABLE OF ORGANIZATIONAL EQUIPMENT
NALF – NAVY AUXILLIARY LANDING FIELD
NAS – IN GEOGRAPHICAL REFERENCE: NAVAL AIR STATION
NAS – IN AIRSPACE REFERENCE: NATIONAL AIRSPACE
NAWS – NAVAL AIR WEAPONS STATION
NOLF – NAVAL OUTLYING FIELD
NS – NAVAL STATION
NTTR – NEVADA TEST AND TRAINING RANGE
PACAF – PACIFIC AIR FORCE
PACOM – PACIFIC COMMAND
POM – PROGRAM OBECTIVE MEMORANDUM
PT – POINT
RPA – REMOTELY PILOTED AIRCRAFT
SATCOM – SATELLITE COMMUNICATIONS
SCLA – SOUTHERN CALIFORNIA LOGISTICS AIRFIELD
SO – SENSOR OPERATOR
SOF – SPECIAL OPERATIONS FORCES
SOS – SPECIAL OPERAIONTS SQUADRON
SPT – SUPPORT
SQFT – SQUARE FOOT
SSTC – SILVER STRAND TRAINING COMPLEX
STUAS – SMALL TACTICAL UNMANNED AERIAL SYSTEM
SUA – SPECIAL USE AIRSPACE
T/O – TABLE OF ORGANIZATION
TCDL – TACTICAL COMMON DATA LINK
TECOM – TRAINING AND EDUCATION COMMAND
TSRA – TRAINING SYSTEMS REQUIREMENTS ANALYSIS
UAC – UNMANNED AIRCRAFT COMMANDER
UAS – UNMANNED AIRCRAFT SYSTEMS
UCAS – UNMANNED COMBAT AIR SYSTEM
UCLASS – UNMANNED CARRIER LAUNCHED AIRBORNE SURVEILLANCE AND STRIKE
USAF – UNITED STATES AIR FORCE
UDET – UNMANNED DETACHMENT
URT – UNMANNED RPA TRAINING
USA – UNITED STATES ARMY
USAF – UNITED STATES AIR FORCE
USAFE – UNITED STATES AIR FORCE EUROPE
USMC – UNITED STATES MARINE CORPS
USN – UNITED STATES NAVY
USSOCOM – UNITED STATES SPECIAL OPS COMMAND
VMU – VEHICLE MAINTENANCE UNIT
VTUAV – VERTICAL TACTICAL UNMANNED AERIAL VEHICLE
WSMR – WHITE SAND MISSILE RANGE COMPLEX