DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

CERTIFICATE OF WAIVER OR AUTHORIZATION

ISSUED TO

Department of the Army

Army Aviation Applied Technology Directorate (AATD)
AMSRD-AMR-AA-F
401 Lee Blvd, Fort Eustis, VA 23604-5577

This certificate is issued for the operations specifically described hereinafter. No person shall conduct any operation pursuant to the authority of this certificate except in accordance with the standard and special provisions contained in this certificate, and such other requirements of the Federal Aviation Regulations not specifically waived by this certificate.

OPERATIONS AUTHORIZED

Operation of the YMQ-18A Hummingbird, Unmanned Aircraft System (UAS) in Class D, G and E airspace at Southern California Logistics Airport SCLA (VCV) and the transit corridor between VCV and R-2515 at or below 13,000' MSL under the jurisdiction of VCV Air Traffic Control Tower (ATCT) and High Desert Terminal Radar Approach Control (TRACON) (E10).

LIST OF WAIVED REGULATIONS BY SECTION AND TITLE

N/A

STANDARD PROVISIONS

1. A copy of the application made for this certificate shall be attached and become a part hereof.
2. This certificate shall be presented for inspection upon the request of any authorized representative of the Federal Aviation Administration, or of any State or municipal official charged with the duty of enforcing local laws or regulations.
3. The holder of this certificate shall be responsible for the strict observance of the terms and provisions contained herein.
4. This certificate is nontransferable.

Note-This certificate constitutes a waiver of those Federal rules or regulations specifically referred to above. It does not constitute a waiver of any State law or local ordinance.

SPECIAL PROVISIONS

Special Provisions are set forth and attached.

This certificate 2011-WSA-126 is effective from April 26, 2012 to April 25, 2013 and is subject to cancellation at any time upon notice by the Administrator or his/her authorized representative.

BY DIRECTION OF THE ADMINISTRATOR

FAA Headquarters, AJV-13
(Region)

M. Randy Willis
(Signature)

April 24, 2012
(Date)

Acting Manager, Unmanned Aircraft Systems
(Title)

FAA Form 7711-1 (7-74)

COA Number: 2011-WSA-126

Issued To: Department of the Army, referred herein as the "proponent"

Address: Army Aviation Applied Technology Directorate (AATD)
AMSRD-AMR-AA-F
401 Lee Blvd, Fort Eustis, VA 23604-5577

Activity: Operation of the YMQ-18A Hummingbird, Unmanned Aircraft System (UAS) in Class D, G and E airspace at Southern California Logistics Airport SCLA (VCV) and the transit corridor between VCV and R-2515 at or below 13,000' MSL under the jurisdiction of VCV Air Traffic Control Tower (ATCT) and High Desert Terminal Radar Approach Control (TRACON) (E10).

Purpose: To prescribe UAS operating requirements in the National Airspace System (NAS) for the purpose of research and development flights.

Dates of Use: This COA is valid from April 26, 2012 through April 25, 2013. Should a renewal become necessary, the proponent shall advise the Federal Aviation Administration (FAA), in writing, no later than 60 business days prior to the requested effective date.

Public Aircraft

1. A public aircraft operation is determined by statute, 49 USC §40102(a)(41) and §40125. All public aircraft flights conducted under a COA must comply with the terms of the statute.
2. All flights must be conducted per the declarations submitted on COA on-line.

STANDARD PROVISIONS

A. General.

The review of this activity is based upon current understanding of UAS operations and their impact in the NAS. This COA will not be considered a precedent for future operations. (As changes in or understanding of the UAS industry occur, limitations and conditions for operations will be adjusted.)

All personnel connected with the UAS operation must read and comply with the contents of this authorization and its provisions.

A copy of the COA including the special limitations must be immediately available to all operational personnel at each operating location whenever UAS operations are being conducted.

This authorization may be canceled at any time by the Administrator, the person authorized to grant the authorization, or the representative designated to monitor a specific operation. As a general rule, this authorization may be canceled when it is no longer required, there is an abuse of its provisions, or when unforeseen safety factors develop. Failure to comply with the authorization is cause for cancellation. The proponent will receive written notice of cancellation.

During the time this COA is approved and active, a site safety evaluation/visit will be accomplished to ensure COA compliance, assess any adverse impact on ATC or airspace, and ensure this COA is not burdensome or ineffective. Deviations, accidents/incidents/mishaps, complaints, etc will prompt a COA review or site visit to address the issue. Refusal to allow a site safety evaluation/visit may result in cancellation of the COA.

B. Airworthiness Certification.

The unmanned aircraft must be shown to be airworthy to conduct flight operations in the NAS. The Department of the Army has made its own determination that the YMQ-18A unmanned aircraft is airworthy. The YMQ-18A must be operated in strict compliance with all provisions and conditions contained in the Airworthiness Safety Release, including all documents and provisions referenced in this COA application.

1. A configuration control program must be in place for hardware or and/software changes made to the UAS to ensure continued airworthiness. If a new or revised Airworthiness Release is generated as a result of changes in the hardware or software affecting the operating characteristics of the UAS, no further flight is authorized until the UAPO has reviewed these changes and determined whether new safety mitigations are required.

2. The YMQ-18A must be operated in strict compliance with all provisions and conditions contained within the spectrum analysis assigned and authorized for use within the defined operations area.

3. All items contained in the application for equipment frequency allocation must be adhered to, including the assigned frequencies and antenna equipment characteristics. A ground operational check to verify the control station can communicate with the aircraft (frequency integration check) must be conducted prior to the launch of the

unmanned aircraft to ensure any electromagnetic interference does not adversely affect control of the aircraft.

4. The use of a Traffic Collision Avoidance System (TCAS) in any mode while operating an unmanned aircraft is prohibited.

C. Operations.

1. Unless otherwise authorized as a special provision, a maximum of one unmanned aircraft will be controlled:
   a. In any defined operating area,
   b. From a single control station, and
   c. By one pilot at a time.
2. A Pilot-in-Command (PIC) is the person who has final authority and responsibility for the operation and safety of flight, has been designated as PIC before or during the flight, and holds the appropriate category, class, and type rating, if appropriate, for the conduct of the flight. The responsibility and authority of the PIC as described by 14 CFR 91.3, Responsibility and Authority of the Pilot in Command, apply to the unmanned aircraft PIC. The PIC position may rotate duties as necessary with equally qualified pilots. The individual designated as PIC may change during flight. Note: The PIC can only be the PIC for one aircraft at a time. For Optionally Piloted Aircraft (OPA), PIC must meet UAS guidance requirements for training, pilot licensing, and medical requirements when operating OPA as a UAS.
3. The PIC must conduct a pre-takeoff briefing as applicable prior to each launch. The briefing should include but is not limited to the
   a. Contents of the COA,
   b. Altitudes to be flown,
   c. Mission overview including handoff procedures,
   d. Frequencies to be used,
   e. Flight time, including reserve fuel requirements,
   f. Contingency procedures to include lost link, divert, and flight termination, and
   g. Hazards unique to the flight being flown.

Note: Flightcrew Member (UAS). In addition to the flightcrew members identified in 14 CFR part 1, Definitions and Abbreviations, an Unmanned Aircraft System flightcrew member includes pilots, sensor/payload operators, and visual observers but may include other persons as appropriate or required to ensure safe operation of the aircraft.

4. All operations will be conducted in compliance with Title 14 CFR Part 91. Special attention should be given to:
   a. § 91.3 Responsibility and authority of the pilot in command.
   b. § 91.13 Careless or reckless operation

c. § 91.17 Alcohol or drugs
d. § 91.103 Preflight Actions
e. § 91.111 Operating near other aircraft
f. § 91.113 Right-of-way rules: Except water operations
g. § 91.115 Right-of-way rules: Water operations
h. § 91.119 Minimum safe altitudes: General
i. § 91.123 Compliance with ATC clearances and instructions
j. § 91.133 Restricted and prohibited areas
k. § 91.137 Temporary flight restrictions in the vicinity of disaster/hazard areas
l. § 91.145 Management of aircraft operations in the vicinity of aerial demonstrations and major sporting events
m. § 91.151 Fuel requirements for flight in VFR conditions
n. § 91.155 Basic VFR weather minimums
o. § 91.159 VFR cruising altitude or flight level
p. §91.209 Aircraft Lights
q. § 91.213 Inoperative instruments and equipment
r. § 91.215 ATC transponder and altitude reporting equipment and use
s. Appendix D to Part 91—Airports/Locations: Special Operating Restrictions

5. Unless otherwise authorized as a special provision, all operations must be conducted in visual meteorological conditions (VMC) during daylight hours in compliance with Title 14 of the Code of Federal Regulations (CFR) part 91 §91.155 and the following:
6. Special Visual Flight Rules (VFR) operations are not authorized.
   a. VFR cloud clearances specified in 14 CFR part 91 §91.155, must be maintained, except in Class G airspace where Class E airspace visibility requirements must be applied, but not less than 3 statute miles (SM) flight visibility and 1000’ ceiling.
   b. Flights conducted under Instrument Flight Rules (IFR) in Class A airspace shall remain clear of clouds. **NOTE: Deviations from IFR clearance necessary to comply with this provision must have prior ATC approval**
   c. Chase aircraft must maintain 5 NM flight visibility.
7. Night operations are prohibited unless otherwise authorized as a special provision.
8. Operations (including lost link procedures) must not be conducted over populated areas, heavily trafficked roads, or an open-air assembly of people.

D. Air Traffic Control (ATC) Communications.

1. The pilot and/or PIC will maintain direct, two-way communication with ATC and have the ability to maneuver the unmanned aircraft in response to ATC instructions, unless addressed in the Special Provision Section.

a. When required, ATC will assign a radio frequency for air traffic control during flight. The use of land-line and/or cellular telephones is prohibited as the primary means for in-flight communication with ATC.

2. The PIC must not accept an ATC clearance requiring the use of visual separation, sequencing, or visual approach.

3. When necessary, transit of airways and routes must be conducted as expeditiously as possible. The unmanned aircraft must not loiter on Victor airways, jet routes, Q and T routes, IR routes, or VR routes.

4. For flights operating on an IFR clearance at or above 18,000 feet mean sea level (MSL), the PIC must ensure positional information in reference to established National Airspace System (NAS) fixes, navaids, and/or waypoints is provided to ATC. The use of latitude/longitude positions is not authorized, except oceanic flight operations.

5. If equipped, the unmanned aircraft must operate with

a. An operational mode 3/A transponder with altitude encoding, or mode S transponder (preferred) set to an ATC assigned squawk

b. Position/navigation and anti-collision lights on at all times during flight unless stipulated in the special provisions or the proponent has a specific exemption from 14 CFR part 91.209.

6. Operations that use a Global Positioning System (GPS) for navigation must check Receiver Autonomous Integrity Monitoring (RAIM) notices prior to flight operations. Flight into a GPS test area or degraded RAIM is prohibited for those aircraft that use GPS as their sole means for navigation.

E. Safety of Flight.

1. The proponent or delegated representative is responsible for halting or canceling activity in the COA area if, at any time, the safety of persons or property on the ground or in the air is in jeopardy, or if there is a failure to comply with the terms or conditions of this authorization.

2. ATC must be immediately notified in the event of any emergency, loss and subsequent restoration of command link, loss of PIC or observer visual contact, or any other malfunction or occurrence that would impact safety or operations.

3. Sterile Cockpit Procedures.

a. Critical phases of flight include all ground operations involving

(1) Taxi (movement of an aircraft under its own power on the surface of an airport)

(2) Take-off and landing (launch or recovery)

(3) All other flight operations in which safety or mission accomplishment might be compromised by distractions.

b. No crewmember may perform any duties during a critical phase of flight not required for the safe operation of the aircraft.

c. No crewmember may engage in, nor may any PIC permit, any activity during a critical phase of flight which could

(1) Distract any crewmember from the performance of his/her duties or

(2) Interfere in any way with the proper conduct of those duties.

d. The pilot and/or the PIC must not engage in any activity not directly related to the operation of the aircraft. Activities include, but are not limited to, operating UAS sensors or other payload systems.

e. The use of cell phones or other electronic devices is restricted to communications pertinent to the operational control of the unmanned aircraft and any required communications with Air Traffic Control.

4. See-and-Avoid.

Unmanned aircraft have no on-board pilot to perform see-and-avoid responsibilities; therefore, when operating outside of active restricted and warning areas approved for aviation activities, provisions must be made to ensure an equivalent level of safety exists for unmanned operations. Adherence to 14 CFR part 91 §91.111, §91.113 and §91.115, is required.

a. The proponent and/or delegated representatives is responsible at all times for collision avoidance with all aviation activities and the safety of persons or property on the surface with respect to the UAS.

b. UAS pilots will ensure there is a safe operating distance between aviation activities and unmanned aircraft at all times.

c. Any crew member responsible for performing see-and-avoid requirements for the UA must have and maintain instantaneous communication with the pilot flying.

d. UA operations will only be conducted within Reduced Vertical Separation Minimum (RVSM) altitudes, when appropriately equipped or having received a clearance under an FAA deviation. NOTE: UA operations should not plan on receiving an Enroute clearance in RVSM altitudes, without being RVSM equipped.

e. Visual observers must be used at all times except in Class A, airspace, active Restricted Areas, and Warning areas designated for aviation activities.

(1) The observers may either be ground-based or in a chase plane.

(2) If the chase aircraft is operating more than 100 feet above/below and/or more than ½ NM laterally of the unmanned aircraft, the chase aircraft PIC will advise the controlling ATC facility.

f. The PIC is responsible to ensure the visual observers are;

(1) Able to see the aircraft and the surrounding airspace throughout the entire flight, and

(2) Able to determine the UA’s altitude, flight path, and proximity to all aviation activities and other hazards (e.g., terrain, weather, structures) sufficiently to exercise effective control of the UA to

(a) Comply with CFR 91.111, 91.113 and 91.115, and

(b) Prevent the UA from creating a collision hazard.

5. Observers must be able to communicate clearly to the pilot any instructions required to remain clear of conflicting traffic, using standard phraseology as listed in the aeronautical information manual when practical.

6. Pilots and observers must not perform crew duties for more than one unmanned aircraft at a time.

7. A PIC may rotate duties as necessary to fulfill operational requirements; a PIC must be designated at all times.

8. Pilots flying chase aircraft must not concurrently perform observer or UA pilot duties.

9. Pilot and observers must not assume concurrent duties as both pilot and observer.

10. The required number of ground observers will be in place during flight operations.

11. The use of multiple successive observers (daisy chaining) is prohibited unless otherwise authorized as a special provision.

12. The dropping or spraying of aircraft stores, or carrying of hazardous materials (including ordnance) outside of active Restricted, Prohibited, or Warning Areas approved for aviation activities is prohibited unless specifically authorized as a special provision.

F. Crewmember Requirements.

1. All crewmembers associated with the operation of the unmanned aircraft, including chase operations, must be qualified or must be receiving formal training under the direct supervision of a qualified instructor, who has at all times, responsibility for the operation of the unmanned aircraft.

2. Pilots and observers must have an understanding of, and comply with, Title 14 Code of Federal Regulations, and/or agency directives and regulations, applicable to the airspace where the unmanned aircraft will operate.

3. Pilots, supplemental pilots, and observers must maintain a current second class (or higher) airman medical certificate that has been issued under 14 CFR part 67, or an FAA accepted agency equivalent based on the application.

~~4.~~ At a minimum, the use of alcohol and/or drugs in violation of 14 CFR part 91 §91.17 applies to UA pilots and observers

5. At a minimum, observers must receive training on rules and responsibilities described in 14 CFR part 91 §91.111. §91.113 and §91.115, regarding cloud clearance, flight visibility, and the pilot controller glossary, including standard ATC phraseology and communication.

6. Recent Pilot Experience (Currency). The proponent must provide documentation, upon request, showing the pilot/supplemental pilot/PIC maintains an appropriate level of recent pilot experience in either the UAS being operated or in a certified simulator. At a minimum, he/she must conduct three takeoffs (launch) and three landings (recovery) in the specific UAS within the previous 90 days (excluding pilots who do not conduct

launch/recovery during normal/emergency operations). If a supplemental pilot assumes the role of PIC, he/she must comply with PIC rating requirements.

7. A PIC and/or supplemental pilot have the ability to assume the duties of an *internal* or an *external* UAS pilot at any point during the flight.

8. A PIC may be augmented by supplemental pilots.

9. PIC Ratings.

Rating requirements for the UAS PIC depend on the type of operation conducted. The requirement for the PIC to hold, at a minimum, a current FAA private pilot certificate or the FAA accepted agency equivalent, based on the application or 14 CFR Part 61, and is predicated on various factors including the location of the planned operations, mission profile, size of the unmanned aircraft, and whether or not the operation is conducted within or beyond visual line-of-sight.

a. The PIC must hold, at a minimum, a current FAA private pilot certificate or the FAA accepted agency equivalent, based on the application or 14 CFR Part 61.under all operations:

(1) Approved for flight in Class A, B, C, D, E, and G (more than 400 feet above ground level (AGL)) airspace

(2) Conducted under IFR (FAA instrument rating required, or the FAA accepted agency equivalent, based on the application or 14 CFR Part 61.

(3) Approved for night operations

(4) Conducted at or within 5 NM of a joint use or public airfields.

(5) Requiring a chase aircraft

(6) At any time the FAA has determined the need based on the UAS characteristics, mission profile, or other operational parameters.

b. Operations without a pilot certificate may be allowed when **all** of the following conditions are met:

(1) The PIC has successfully completed, at a minimum, FAA private pilot ground instruction and passed the written examination, or the FAA accepted agency equivalent, based on the application. Airman Test reports are valid for the 24-calendar month period preceding the month the exam was completed, at which time the instruction and written examination must be repeated.

(2) Operations are during daylight hours.

(3) The operation is conducted in a sparsely populated location.

(4) The operation is conducted from a privately owned airfield, military installation, or off-airport location.

(5) Operations are approved and conducted solely within visual line-of-sight in Class G airspace.

(6) Visual line-of-sight operations are conducted at an altitude of no more than 400 feet AGL in class G airspace at all times.

c. The FAA requires specific aircraft category and class ratings in manned aircraft depending on the UAS seeking approval and the characteristics of its flight controls interface.

10. PIC Recent Flight Experience (Currency).

a. For those operations that require a certificated pilot or FAA accepted agency equivalent, based on the application, the PIC, must have flight reviews and if the pilot conducts takeoff, launch, landing or recovery maintain recent pilot experience in manned aircraft per 14 CFR §§ 61.56, Flight Review;, Recent Flight Experience: Pilot in Command.

b. For operations approved for night or IFR through special provisions, the PIC must maintain minimum recent pilot experience per § 61.57 as applicable.

11. Supplemental Pilot Ratings.

Supplemental pilots must have, at a minimum, successfully completed private pilot ground school and passed the written test or the FAA accepted agency equivalent, based on the application. The ground school written test results are valid for two years from the date of completion, at which time the instruction and written examination must be repeated. If a supplemental pilot assumes the role of PIC, he/she must comply with PIC rating, currency, medical, and training requirements listed in this document.

12. Ancillary personnel such as systems operators or mission specialists must be thoroughly familiar with and possess operational experience of the equipment being used. If the systems being used are for observation and detection of other aircraft for collision avoidance purposes, personnel must be thoroughly trained on collision avoidance procedures and techniques and have direct communication with the UAS pilot, observer, and other crewmembers.

G. Notice to Airmen (NOTAM).

1. A distance (D) NOTAM must be issued when unmanned aircraft operations are being conducted. This requirement may be accomplished

a. Through the proponent's local base operations or NOTAM issuing authority, or

b. By contacting the NOTAM Flight Service Station at 1-877-4-US-NTMS (1-877-487-6867) not more than 72 hours in advance, but not less than 48 hours prior to the operation, unless otherwise authorized as a special provision. The issuing agency will require the:

(1) Name and address of the pilot filing the NOTAM request

(2) Location, altitude, or operating area

(3) Time and nature of the activity.

2. For proponents filing their NOTAM with the Department of Defense: The requirement to file with an Automated Flight Service Station (AFSS) is in addition to any local procedures/requirements for filing through the Defense Internet NOTAM Service (DINS).

H. Data Reporting.

1. Documentation of all operations associated with UAS activities is required regardless of the airspace in which the UAS operates. This requirement includes COA operations within Special Use airspace. NOTE: Negative (zero flights) reports are required.
2. The proponent must submit the following information through *UAS COA On-Line* on a monthly basis:
   a. The number of flights conducted under this COA. (A flight during which any portion is conducted in the NAS must be counted only once, regardless of how many times it may enter and leave Special Use airspace between takeoff and landing)
   b. Aircraft operational hours per flight
   c. Ground control station operational hours in support of each flight, to include Launch and Recovery Element (LRE) operations
   d. Pilot duty time per flight
   e. Equipment malfunctions (hardware/software) affecting either the aircraft or ground control station
   f. Deviations from ATC instructions and/or Letters of Agreement/Procedures
   g. Operational/coordination issues
   h. The number and duration of lost link events (control, vehicle performance and health monitoring, or communications) per aircraft per flight.

I. Incident/Accident/Mishap Reporting.

Immediately after an incident or accident, and before additional flight under this COA, the proponent must provide initial notification of the following to the FAA via the *UAS COA On-Line* forms (Incident/Accident):

1. All accidents/mishaps involving UAS operations where any of the following occurs:
   a. Fatal injury, where the operation of a UAS results in a death occurring within 30 days of the accident/mishap
   b. Serious injury, where the operation of a UAS results in a hospitalization of more than 48 hours, the fracture of any bone (except for simple fractures of fingers, toes, or nose), severe hemorrhage or tissue damage, internal injuries, or second or third-degree burns
   c. Total unmanned aircraft loss
   d. Substantial damage to the unmanned aircraft system where there is damage to the airframe, powerplant, or onboard systems that must be repaired prior to further flight
   e. Damage to property, other than the unmanned aircraft.
2. Any incident/mishap that results in an unsafe/abnormal operation including but not limited to

a. A malfunction or failure of the unmanned aircraft's on-board flight control system (including navigation)

b. A malfunction or failure of ground control station flight control hardware or software (other than loss of control link)

c. A powerplant failure or malfunction

d. An in-flight fire

e. An aircraft collision

f. Any in-flight failure of the unmanned aircraft's electrical system requiring use of alternate or emergency power to complete the flight

g. A deviation from any provision contained in the COA

h. A deviation from an ATC clearance and/or Letter(s) of Agreement/Procedures

i. A lost control link event resulting in

(1) Fly-away, or

(2) Execution of a pre-planned/unplanned lost link procedure.

3. Initial reports must contain the information identified in the *COA On-Line* Accident/Incident Report.

4. Follow-on reports describing the accident/incident/mishap(s) must be submitted by providing copies of proponent aviation accident/incident reports upon completion of safety investigations. Such reports must be limited to factual information only where privileged safety or law enforcement information is included in the final report.

5. Public-use agencies other than those which are part of the Department of Defense are advised that the above procedures are not a substitute for separate accident/incident reporting required by the National Transportation Safety Board under 49 CFR part 830 §830.5.

6. This COA is issued with the provision that the FAA be permitted involvement in the proponent's incident/accident/mishap investigation as prescribed by FAA Order 8020.11, Aircraft Accident and Incident Notification, Investigation, and Reporting.

FLIGHT STANDARDS SPECIAL PROVISIONS

A. Contingency Planning

1. **Point Identification.** The proponent must submit contingency plans that address emergency recovery or flight termination of the unmanned aircraft (UA) in the event of unrecoverable system failure. These procedures will normally include Lost Link Points (LLP), Divert/Contingency Points (DCP) and Flight Termination Points (FTP) for each operation. LLPs and DCPs must be submitted in latitude/longitude (Lat/Long) format along with a graphic representation plotted on an aviation sectional chart (or similar format). FTPs or other accepted contingency planning measures must also be submitted in latitude/longitude (Lat/Long) format along with a graphic representation

plotted on an aviation sectional chart, or other graphic representation acceptable to the FAA. The FAA accepts the LLPs, DCPs, FTP's, and other contingency planning measures submitted by the proponent, but does not approve them. When conditions preclude the use of FTPs, the proponent must submit other contingency planning options for consideration and approval. At least one LLP, DCP, and FTP (or an acceptable alternative contingency planning measure) is required for each operation. The proponent must furnish this data with the initial COA application. Any subsequent changes or modifications to this data must be provided to AJV-13 for review and consideration no later than 30 days prior to proposed flight operations.

2. **Risk Mitigation Plans**. For all operations, the proponent must develop detailed plans to mitigate the risk of collision with other aircraft and the risk posed to persons and property on the ground in the event the UAS encounters a lost link, needs to divert, or the flight needs to be terminated. The proponent must take into consideration all airspace constructs and minimize risk to other aircraft by avoiding published airways, military training routes, NAVAIDS, and congested areas. In the event of a contingency divert or flight termination, the use of a chase aircraft is preferred when the UAS is operated outside of Restricted or Warning Areas. If time permits, the proponent should make every attempt to utilize a chase aircraft to monitor the aircraft to a DCP or to the FTP. In the event of a contingency divert or flight termination, the proponent will operate in Class A airspace and Special Use airspace to the maximum extent possible to reduce the risk of collision with non-participating air traffic.

   a. **LLP Procedures.**

      (1) LLPs are defined as a point, or sequence of points where the aircraft will proceed and hold at a specified altitude, for a specified period of time, in the event the command and control link to the aircraft is lost. The aircraft will autonomously hold, or loiter, at the LLP until the communication link with the aircraft is restored or the specified time elapses. If the time period elapses, the aircraft may autoland, proceed to another LLP in an attempt to regain the communication link, or proceed to an FTP for flight termination. LLPs may be used as FTPs. In this case, the aircraft may loiter at the LLP/FTP until link is re-established or fuel exhaustion occurs.

      (2) For areas where multiple or concurrent UAS operations are authorized in the same operational area, a segregation plan must be in place in the event of a simultaneous lost link scenario. The segregation plan may include altitude offsets and horizontal separation by using independent LLPs whenever possible.

   b. **DCP Procedures.**

      (1) A DCP is defined as an alternate landing/recovery site to be used in the event of an abnormal condition that requires a precautionary landing. Each DCP must incorporate the means of communication with ATC throughout the descent and landing (unless otherwise specified in the Special Provisions) as well as a plan for ground operations and securing/parking the aircraft on the ground. This includes the availability of ground control stations capable of

launch/recovery, communication equipment, and an adequate power source to operate all required equipment.

(2) For local operations, the DCP specified will normally be the airport/facility used for launch and recovery; however, the proponent may specify additional DCPs as alternates.

(3) For transit and/or mission operations that are being conducted in Class A airspace or Class E airspace above flight level (FL) 600, DCPs will be identified during the flight to be no further than one hour of flight time at any given time, taking into consideration altitude, winds, fuel consumption, and other factors. If it is not possible to define DCPs along the entire flight plan route, the proponent must identify qualified FTPs along the entire route and be prepared to execute flight termination at one of the specified FTPs if a return to base (RTB) is not possible.

(4) It is preferred that specified DCPs are non-joint use military airfields, other government-owned airfields, or private-use airfields. However, the proponent may designate any suitable airfield for review and consideration.

c. **Flight Termination Procedures.**

(1) Flight termination is the intentional and deliberate process of performing controlled flight into terrain (CFIT). Flight termination must be executed in the event that all contingencies have been exhausted and further flight of the aircraft cannot be safely achieved or other potential hazards exist that require immediate discontinuation of flight. FTPs or alternative contingency planning measures must be located within power off glide distance of the aircraft during all phases of flight and must be submitted for review and acceptance. The proponent must ensure sufficient FTPs or other contingency plan measures are defined to accommodate flight termination at any given point along the route of flight. The location of these points is based on the assumption of an unrecoverable system failure and must take into consideration altitude, winds, and other factors.

(2) Unless otherwise authorized, FTPs must be located in sparsely populated areas. Except for on- or near-airport operations, FTPs will be located no closer than five nautical miles from any airport, heliport, airfield, NAVAID, airway, populated area, major roadway, oil rig, power plant, or any other infrastructure. For offshore locations, the proponent must refer to appropriate United States Coast Guard (USCG) charts and other publications to avoid maritime obstructions, shipping lanes, and other hazards. Populated areas are defined as those areas depicted in yellow on a VFR sectional chart or as determined from other sources.

(a) It is preferred that flight termination occurs in Restricted or Warning Areas, government-owned land, or offshore locations that are restricted from routine civil use. However, the proponent may designate any suitable location for review and consideration.

(b) The proponent is required to survey all designated areas prior to their use as an FTP. All FTPs will be reviewed for suitability on a routine and periodic basis, not to exceed six months. The proponent assumes full risk and all liability associated with the selection and use of any designated FTP.

(c) It is desirable that the proponent receive prior permission from the land owner or using agency prior to the use of this area as an FTP. The proponent should clearly communicate the purpose and intent of the FTP.

(d) For each FTP, plans must incorporate the means of communication with ATC throughout the descent as well as a plan for retrieval/recovery of the aircraft.

(e) Contingency planning must take into consideration all airspace constructs and minimize risk to other aircraft by avoiding published airways, military training routes, NAVAIDS, and congested areas to the maximum extent possible.

(f) In the event of a contingency divert or flight termination, if time permits, the use of a chase aircraft is preferred when the UA is operated outside of Restricted or Warning Areas.

(g) In the event of a contingency divert or flight termination or other approved contingency measures, the proponent will operate in Class A airspace and Special Use airspace to the maximum extent possible to reduce the risk of collision with non-participating air traffic.

B. The United States Army UAS Project Office has stated in its COA application all frequencies used are in the unlicensed industrial, scientific and medical (ISM) radio bands utilizing Part 15 compliant devices and according to the United States Army UAS Project Office no National Telecommunications and Information Administration (NTIA)/ federal Communications Commission (FCC) authorization is required. As such, the United States Army UAS Project Office is prohibited from utilizing any frequencies which would require NTIA/FCC authorization.

AIR TRAFFIC CONTROL PROVISIONS

C. Coordination Requirements.

1. see LOA

D. Communication Requirements.

1. See LOA

E. Flight Planning Requirements.

1. See LOA

F. Procedural Requirements.

1. Prior to commencing operations, the proponent shall enter into a written Letter of Agreement with the KVCV Air Traffic Control Tower, High Desert Terminal Radar Approach Control and the KVCV Airport Management. The LOA, as a minimum, shall cover notification, communication, coordination, schedule deconfliction and operational segregation requirements.

G. Emergency/Contingency Procedures.

Lost Link:

In the event of a lost link, the UAS pilot will immediately notify VCV ATCT at (760-246-7827) or E10 at (661-277-3843) as appropriate, state pilot intentions, and comply with the following provisions:

1. If lost link occurs while operating in the VCV Class D airspace the YMQ-18A will execute its “return to home” profile (see attachments 1-3) and execute an autonomous landing on the Warrior Ramp.
2. If the lost link occurs when the YMQ-18A is flown in the flight corridor between the Victorville Class D airspace and R-2515, the UA will execute its “return to home” profile (see attachment 1 and 2) and execute an autonomous landing on the Warrior Ramp.
3. If lost link occurs within a restricted or warning area, or the lost link procedure above takes the UA into the restricted or warning area – the aircraft will not exit the restricted or warning areas until the link is re-established.
4. The unmanned aircraft lost link mission will not transit or orbit over populated areas.
5. Lost link programmed procedures will avoid unexpected turn-around and/or altitude changes and will provide sufficient time to communicate and coordinate with ATC.
6. Lost link orbit points shall not coincide with the centerline of Victor airways.

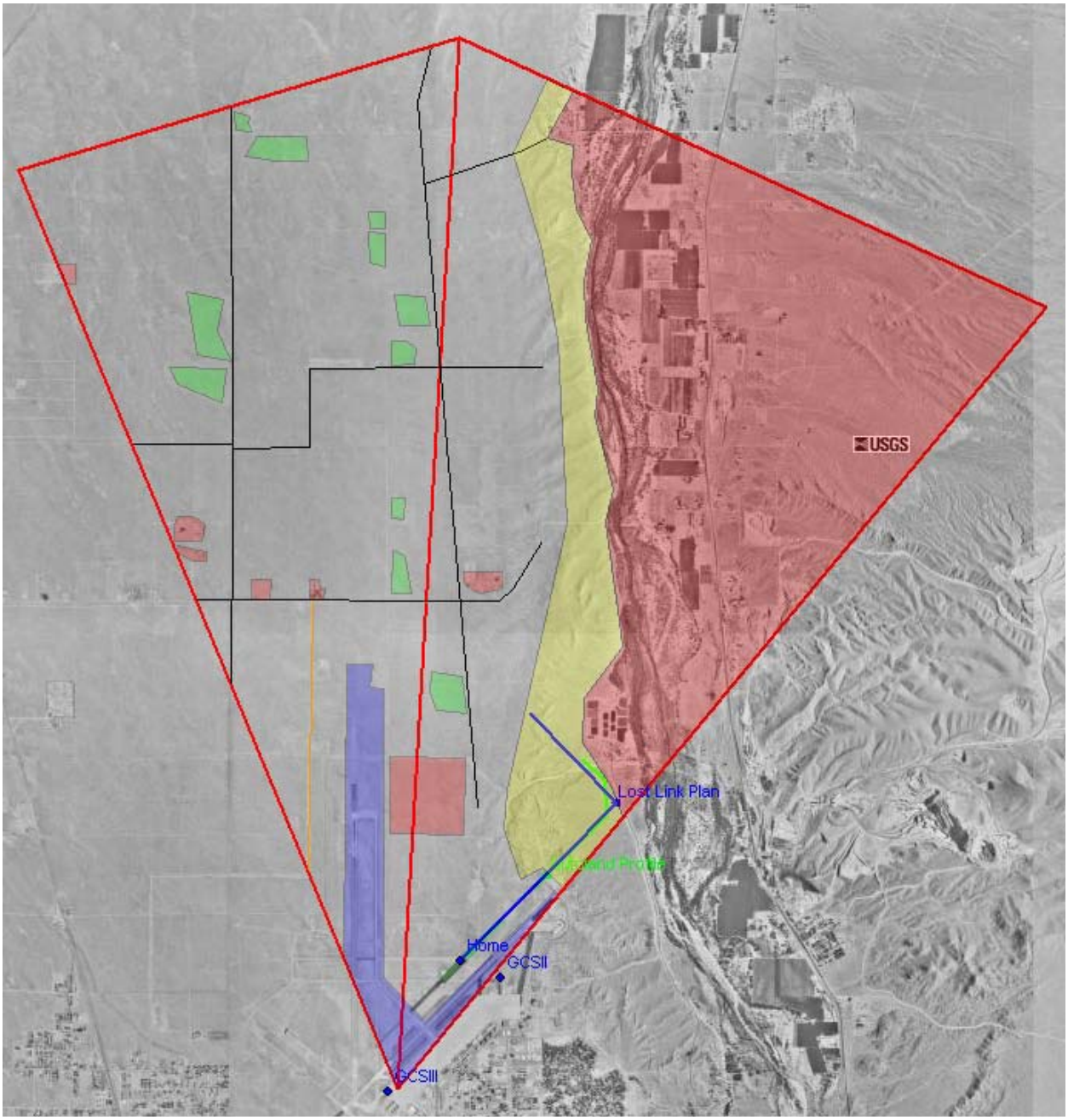
AUTHORIZATION

This Certificate of Waiver or Authorization does not, in itself, waive any Title 14 Code of Federal Regulations, nor any state law or local ordinance. Should the proposed operation conflict with any state law or local ordinance, or require permission of local authorities or property owners, it is the responsibility of the Department of the Army to resolve the matter. This COA does not authorize flight within Special Use airspace without approval from the using agency. The Department of the Army is hereby authorized to operate the YMQ-18A Unmanned Aircraft System in the operations area depicted in the Activity section of this attachment.

Attachment 1

Local Operating Area at SCLA, Victorville, CA

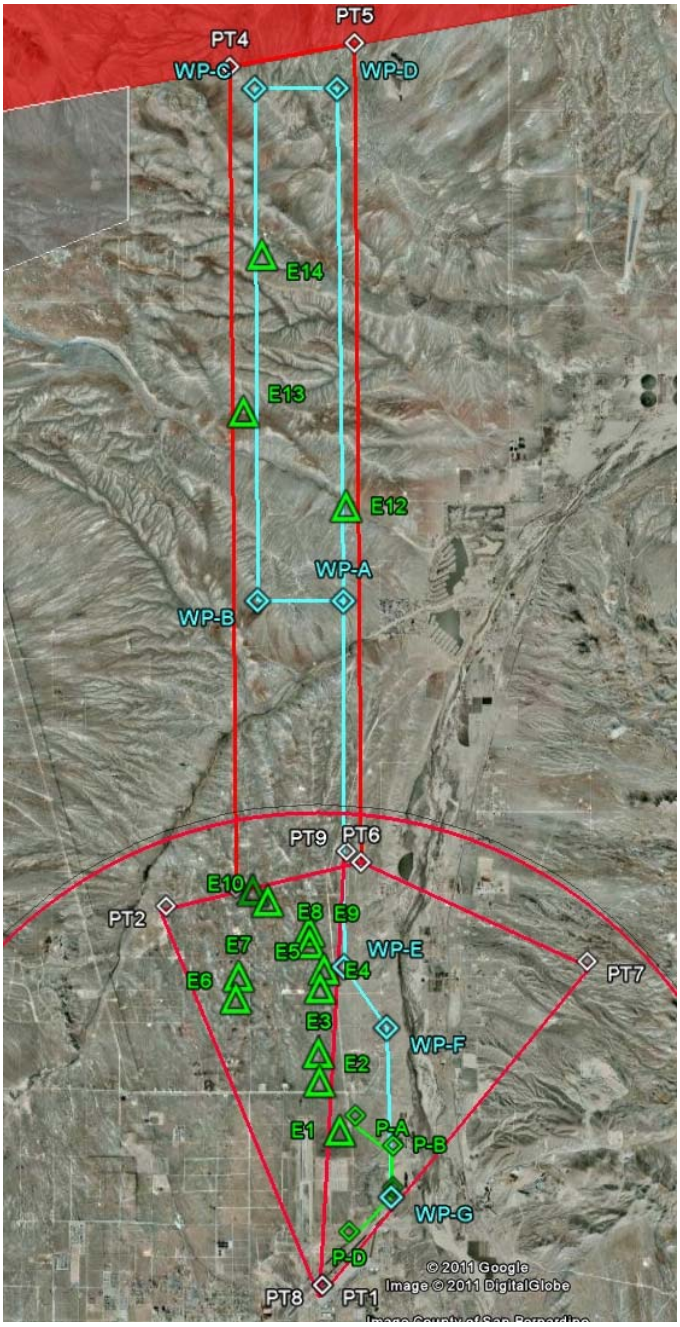
Local flight area within the Class D Airspace at SCLA. Blue areas are airport runways; Red areas are no-fly zones; Yellow areas are uninhabited rough terrain, Green areas are pre-surveyed potential emergency landing sites. The Blue line denotes the pre-programmed lost link final approach path to the landing site. The Warrior Ramp take/off and landing site is denoted as "Home".



Attachment 2

Authorization for operation of theYMQ-18A is requested for flights within the Class D Airspace at Southern California Logistic Airport (SCLA) and, in addition, within a corridor extending from SCLA Class D Airspace to R-2515. The circle shown in Figure 1 is the Class D Airspace at SCLA. North of the circle is the corridor from SCLA to R-2515.

Class D Airspace and Corridor to R-2515



Attachment 3

A LETTER OF AGREEMENT
BETWEEN
VICTORVILLE AIRPORT TRAFFIC CONTROL TOWER, HIGH DESERT
TERMINAL RADAR APPROACH CONTROL, AND THE US ARMY AVIATION
APPLIED TECHNOLOGY DIRECTORATE

EFFECTIVE: June 7, 2010

SUBJECT: Unmanned Aircraft Systems (UAS): UAS operations at the Southern California Logistics Airport (VCV) Class D, G and E airspace.

1. Purpose: To establish procedures for operations of the A160 Hummingbird UAS within VCV Class D airspace and the Class G and E airspace below 13,000 feet mean sea level (MSL) between the northern boundary of the VCV Class D airspace and the southern boundary of R-2515.

2. Scope: The procedures herein apply to VCV Airport Traffic Control Tower (ATCT), High Desert Terminal Radar Approach Control (E10) and the U.S. Army Aviation Applied Technology Directorate (AATD).

3. Responsibilities: Parties of this Letter of Agreement (LOA) shall ensure their respective personnel comply with its provisions.

4. Scheduling/Cancellation:

    a. UAS operators will submit a request for issuance of a Notice to Airman (NOTAM) to VCV Airport Operations no later than one business day prior to UAS flight within VCV Class D airspace.

    b. A current Letter of Agreement and FAA 7711-1 on file with VCV ATCT and airport operations are the prerequisite for NOTAM consideration.

5. Procedures:

    a. General:

        (1) Operators will comply with all Air Traffic Control (ATC) instructions/clearances.

        (2) All VCV Class D UAS operations will be conducted within the area depicted in attachment 1 below.

(3) It is the responsibility of the Pilot in Command (PIC) or Mission Commander (MC) to ensure VCV ATCT is informed of completion of UAS flight operations.

(4) VCV ATCT will advise E10 of daily completion of flight operations.

(5) It is the responsibility of AATD to deconflict operational schedules with other UAS operators. VCV ATCT will not be involved with deconfliction of proposed flight schedules.

(6) All flight communications for launch and recovery at VCV, or VCV Class D airspace shall be accomplished on VCV ATCT assigned frequencies.

(7) UAS will be assigned a discrete squawk of 0106 from VCV ATCT prior to departing the VCV Class D airspace.

(8) VCV ATCT shall advise E10 when UAS is airborne and proceeding to E10 airspace.

(9) Operators will maintain two-way radio communications with E10 on an ATC assigned frequency while operating outside of VCV Class D airspace.

b. Distress/Emergency Situation

(1) If voice communications between the PIC and ATC are lost, ATC will be notified immediately via recorded telephone line. The UAS can continue to operate as originally cleared, as long as acceptable alternate direct two-way communications are maintained between ATC and the PIC. ATC may terminate the flight if the alternate communication method becomes unmanageable and detracts from the safety of the operation.

(2) Ground observers shall maintain visual contact with the UAS during all phases of flight within the Class D airspace. If the ground observers lose sight of the UAS while in operation, the following methodologies shall be employed:

(a) The ground observer shall communicate directly to the PIC that visual contact has been lost and that attempts to regain visual observation are being employed.

(b) Subsequently, the PIC shall contact VCV ATCT to inform that visual contact has been lost by the ground observers and that the UAS will orbit over the operating site until visual contact can be reacquired. If visual contact is not acquired within three minutes, the PIC will fly the UAS to the rally point (normally over the Warrior Ramp) and land.

(c) Once visual contact of the UAS is reacquired, the observer will communicate to the PIC that visual contact has been reestablished.

(d) If loss of visual contact of the UAS occurs during the recovery phase of flight, the UAS will continue in its landing process.

(e) In the event of an UAS emergency, the PIC shall contact the appropriate ATC facility immediately to advise of the situation and intentions. Manned aircraft emergencies shall take priority over unmanned aircraft emergencies. The UAS PIC shall comply with all ATC instructions that may include returning to rally point, holding, or land now to accommodate a manned aircraft emergency.

NOTE: The Airport Director is the final authority for all ground based operations onboard Southern California Logistics Airport.

Attachment “A”

Local Operating Area at SCLA, Victorville, CA

Shown in Figure below is the specific local flight area within the Class D Airspace at SCLA that will be used during flights by the A160. Blue areas are airport runways; Red areas are no-fly zones; Yellow areas are uninhabited rough terrain, Green areas are pre-surveyed potential emergency landing sites. The Blue line denotes the pre-programmed lost link final approach path to the landing site. The Warrior Ramp take/off and landing site is denoted as "Home".