

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

CERTIFICATE OF WAIVER OR AUTHORIZATION

ISSUED TO

Department of the Army, UAS Project Office

5300 Sparkman Circle
Redstone Arsenal, AL 35898

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 MQ-5B Hunter Unmanned Aircraft System (UAS) at Cochise College Airport in Class G and E airspace below 18,000' Mean Sea Level (MSL) as depicted (see attachment 1) under the jurisdiction of the Albuquerque Air Route Traffic Control Center (ARTCC).

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-103 is effective from May 7, 2012 to May 6, 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)

May 4, 2012
(Date)

Acting Manager, Unmanned Aircraft Systems
(Title)

ATTACHMENT to FAA FORM 7711-1

Issued To: Department of the Army, UAS Project Office

Address: 5300 Sparkman Circle
Redstone Arsenal, AL 35898

Activity: Operation of the MQ-5B Hunter Unmanned Aircraft System (UAS) at Cochise College Airport in Class G and E airspace below 18,000' Mean Sea Level (MSL) as depicted (see attachment 1) under the jurisdiction of the Albuquerque Air Route Traffic Control Center (ARTCC).

Purpose: To prescribe UAS operating requirements (outside of restricted and/or warning area airspace) in the National Airspace System (NAS) for the purpose of training.

Dates of Use: This Certificate of Authorization (COA) 2011-WSA-103 is valid from May 7, 2012 through May 6, 2013. Should a renewal become necessary, the proponent shall advise the Federal Aviation Administration (FAA), in writing, no later than 60 days prior to the requested effective date.

General Provisions:

- The review of this activity is based on our current understanding of UAS operations, and the impact of such operations in the NAS, and therefore should not be considered a precedent for future operations. As changes occur in the UAS industry, or in our understanding of it, there may be changes to the limitations and conditions for similar operations.
- All personnel connected with the UAS operation must comply with the contents of this authorization and its provisions.
- This COA will be reviewed and amended as necessary to conform to changing UAS policy and guidance.

Safety Provisions:

Unmanned Aircraft (UA) have no on-board pilot to perform see-and-avoid responsibilities, and therefore, when operating outside of restricted areas, special provisions must be made to ensure an equivalent level of safety exists for operations had a pilot been on board. In accordance with 14 CFR Part 91, General Operating and Flight Rules, Subpart J-Waivers, 91.903, Policy and Procedures, the following provisions provide acceptable mitigation of 14 CFR Part 91.111/113 and must be complied with:

- For the purpose of see-and-avoid, visual observers must be utilized at all times except in Class A airspace, restricted areas, and warning areas. The observers may either be ground based or in a chase plane. If the chase aircraft is operating more

than 100ft above/below and or ½ nm laterally, of the UA, the chase aircraft PIC will advise the controlling ATC facility.

- In order to comply with the see and avoid requirements of Title 14 of the Code of Federal Regulations sections 91.111 and 91.113, the pilot-in-command and visual observers must be able to see the aircraft and the surrounding airspace throughout the entire flight; and be able to determine the aircraft's altitude, flight path and proximity to traffic and other hazards (terrain, weather, structures) sufficiently to exercise effective control of the aircraft to give right-of-way to other aircraft, and to prevent the aircraft from creating a collision hazard.
- UAS pilots will ensure there is a safe operating distance between manned and unmanned aircraft at all times in accordance with 14 CFR 91.111, *Operating Near Other Aircraft*, and 14 CFR 91.113, *Right-of-Way Rules*. Cloud clearances and VFR visibilities for Class E airspace will be used regardless of class of airspace. Additionally, UAS operations are advised to operate well clear of all known manned aircraft operations.
- The dropping or spraying of aircraft stores, or carrying of hazardous materials (included ordnance) outside of active Restricted, Prohibited, or Warning Areas is prohibited unless specifically authorized in the Special Provisions of this COA.

Airworthiness Certification Provisions:

- UA must be shown to be airworthy to conduct flight operations in the NAS.
- Public Use Aircraft must contain one of the following:
 - A civil airworthiness certification from the FAA, or
 - A statement specifying that the Department of Defense Handbook "Airworthiness Certification Criteria" (MIL-HDBK-516), as amended, was used to certify the aircraft or
 - Equivalent method of certification.

Pilot / Observer Provisions:

- **Pilot Qualifications:** UA pilots interacting with Air Traffic Control (ATC) shall have sufficient expertise to perform that task readily. Pilots must have an understanding of and comply with Federal Aviation Regulations and Military Regulations applicable to the airspace where the UA will operate. Pilots must have in their possession a current second class (or higher) airman medical certificate that has been issued under 14 CFR 67, Medical Standards and Certification, or a military equivalent. 14 CFR 91.17, Alcohol or Drugs, applies to UA pilots.
- Aircraft and Operations Requirements:
 - Flight Below 18,000 Feet Mean Sea Level (MSL).
 - UA operations below 18,000 feet MSL in any airspace generally accessible to aircraft flying in accordance with visual flight rules (VFR) require visual observers, either airborne or ground-based. Use of ATC radar alone does not constitute sufficient collision risk mitigation in airspace where uncooperative airborne operations may be conducted.

- Flights At or Above 18,000 Feet Mean Sea Level (MSL)
 - When operating on an instrument ATC clearance, the UA pilot-in-command must ensure the following:
 1. An ATC clearance has been filed, obtained and followed.
 2. Positional information shall be provided in reference to established NAS fixes, NAVAIDS, and waypoints. Use of Latitude/Longitude is not authorized.
- **Observer Qualifications:** Observers must have been provided with sufficient training to communicate clearly to the pilot any turning instructions required to stay clear of conflicting traffic. Observers will receive training on rules and responsibilities described in 14 CFR 91.111, *Operating Near Other Aircraft*, 14 CFR 91.113, *Right-of-Way Rules*, cloud clearance, in-flight visibility, and the pilot controller glossary including standard ATC phraseology and communication. Observers must have in their possession a current second class (or higher) airman medical certificate that has been issued under 14 CFR 67, Medical Standards and Certification, or a military equivalent. 14 CFR 91.17, Alcohol or Drugs, applies to UA observers.
- **Pilot-in-Command (PIC) –**
 - **Visual Flight Rules (VFR) as applicable:**
 - The PIC is the person directly responsible for the operation of the UA. The responsibility and authority of the pilot in command as described by 14 CFR 91.3 (or military equivalent), applies to the UAS PIC.
 - The PIC operating a UA in line of sight must pass at a minimum the required knowledge test for a private pilot certificate, or military equivalent, as stated in 14 CFR 61.105, and must keep their aeronautical knowledge up to date.
 - There is no intent to suggest that there is any requirement for the UAS PIC to be qualified as a crewmember of a manned aircraft.
 - Pilots flying a UA on other than instrument flight plans beyond line of sight of the PIC must possess a minimum of a current private pilot certificate, or military equivalent in the category and class, as stated in 14 CFR 61.105.
 - **Instrument Flight Rules (IFR) as applicable:**
 - The PIC is the person directly responsible for the operation of the UA. The responsibility and authority of the pilot in command as described by 14 CFR 91.3 (or military equivalent), applies to the UAS PIC.
 - The PIC must be a certified pilot (minimum of private pilot) of manned aircraft (FAA or military equivalent) in category and class of aircraft flown.
 - The PIC must also have a current/appropriate instrument rating (manned aircraft, FAA or military equivalent) for the category and class of aircraft flown.
- **Pilot Proficiency – VFR/IFR as applicable:**
 - Pilots will not act as a VFR/ IFR PIC unless they have had three qualified proficiency events within the preceding 90 days.

- The term “qualified proficiency event” is a UAS-specific term necessary due to the diversity of UAS types and control systems.
- A qualified proficiency event is an event requiring the pilot to exercise the training and skills unique to the UAS in which proficiency is maintained.
- Pilots will not act as an IFR PIC unless they have had six instrument qualifying events in the preceding six calendar months (an event that requires the PIC to exercise instrument flight skills unique to the UAS).
- **PIC Responsibilities:**
 - Pilots are responsible for a thorough preflight inspection of the UAS. Flight operations will not be undertaken unless the UAS is airworthy. The airworthiness provisions of 14 CFR 91.7, Civil Aircraft Airworthiness, or the military equivalent, apply.
 - One PIC must be designated at all times and is responsible for the safety of the UA and persons and property along the UA flight path.
 - The UAS pilot will be held accountable for controlling their aircraft to the same standards as the pilot of a manned aircraft. The provisions of 14 CFR 91.13, *Careless and Reckless Operation*, apply to UAS pilots.
- **Pilot/Observer Task Limitations:**
 - Pilots and observers must not perform crew duties for more than one UA at a time.
 - Chase aircraft pilots must not concurrently perform either observer or UA pilot duties along with chase pilot duties.
 - Pilots are not allowed to perform concurrent duties both as pilot and observer.
 - Observers are not allowed to perform concurrent duties both as pilot and observer.

Standard Provisions: These provisions are applicable to all operations unless indicated otherwise in the Special Provisions section.

- The UA PIC will maintain direct two-way communications with ATC and have the ability to maneuver the UA per their instructions, unless specified otherwise in the Special Provisions section. The PIC shall comply with all ATC instructions and/or clearances.
- If equipped, the UA shall operate with an operational mode 3/A transponder, with altitude encoding, or mode S transponder (preferred) set to an ATC assigned squawk.
- If equipped, the UA shall operate with position/navigation lights on at all times during flight.
- The UA PIC shall not accept any ATC clearance requiring the use of visual separation or sequencing.
- VFR cloud clearances and visibilities for Class E airspace will be used regardless of class of airspace the UAS is operating in, except when operating in Class A airspace where 14 CFR Part 91.155 will apply.
- Special VFR is not authorized.

- Operations (including lost link procedures) shall not be conducted over populated areas, heavily trafficked roads, or an open-air assembly of people.
- Operations outside of restricted areas, warning areas, prohibited areas (designated for aviation use) and/or Class A airspace may only be conducted during daylight hours, unless authorized in the Special Provisions section.
- Operations shall not loiter on Victor airways, Jet Routes, Q Routes, IR Routes, or VR Routes. When necessary, transit of airways and routes shall be conducted as expeditiously as possible.
- Operations conducted under VFR rules shall operate at appropriate VFR altitudes for direction of flight (14 CFR 91.159).
- The UA PIC or chase plane PIC (whichever is applicable) will notify ATC of any in flight emergency or aircraft accident as soon as practical.
- All operators that use GPS as a sole source must check all NOTAMs and Receiver Autonomous Integrity Monitoring (RAIM). Flight into GPS test area or degraded RAIM is prohibited without specific approval in the special provisions.
- At no time will TCAS be used in any mode while operating an unmanned aircraft.
- Only one UA will be flown in the operating area unless indicated otherwise in the Special Provisions.
- A copy of this COA will be maintained on site by the PIC or designated representative.
- The Department of the Army, and/or its representatives, is responsible at all times for collision avoidance with non-participating aircraft and the safety of persons or property on the surface with respect to the UAS.

Special Provisions:

1. In the event of a lost link, the UAS pilot will immediately notify Albuquerque ARTCC (identifier ZAB) at 505-856-4574, state pilot intentions, and comply with the following provisions (see attachment 2):
 - a. In the event of lost link, the UA will return to the lost link waypoint directly after climbing to programmed altitude.
 - b. If link is reestablished at any time after the aircraft executes its return home, the pilot may resume the planned mission.
 - c. 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.
 - d. The UA lost link mission will not transit or orbit over populated areas.
 - e. When outside of restricted/warning area airspace, lost link programmed procedures will avoid unexpected turn-around and/or altitude changes and will provide sufficient time to communicate and coordinate with ATC.
 - f. Lost link orbit points shall not coincide with the centerline of Victor airways.
2. All UAS operations shall be coordinated through, and shall maintain continuous direct communications with ZAB ARTCC. Notify ZAB Operations Supervisor prior to traffic pattern operations at (505) 856-4574. The notification requirement for operations beyond the traffic pattern is met when the chase plane aircraft

establishes contact with ZAB airborne. The continuous direct communication requirement does not pertain to operations in the traffic pattern.

3. The UAS Mode 3 transponder and altitude encoding shall be on at all times when airborne. A discrete beacon code (if required) will be assigned by ZAB ARTCC. When the UAS is operating with a chase plane, the chase plane shall squawk standby and the UAS shall squawk for the formation. The UAS transponder may be reset in flight if deemed necessary by Air Traffic Control (ATC). The discrete transponder code does not apply to traffic pattern operations. In the traffic pattern, the UAS shall squawk 1200.
4. All ground observers will have communications with the Ground Control Station (GCS) and the airport UNICOM or CTAF (if applicable). The ground observer will not transmit on GCS frequencies unless it is absolutely necessary; they will monitor for situational awareness only. Only the PIC can transmit on UNICOM/CTAF.
5. 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 operation characteristics of the UAS, notify the UAS Integration Office of the changes as soon as practical.
6. The PIC must conduct a pre-takeoff briefing which includes the contents of the COA, altitudes to be flown, initial heading, frequencies to be used, lost link procedures, the parameters for the use of a ditch point, hazards unique for the flight being flown, abnormal/emergency procedures, and the amount of fuel including reserve onboard.
7. If an external pilot assumes the role of PIC, i.e., PIC does not have immediate access to the controls, the external pilot must comply with PIC rating requirements of this COA. External pilots must possess a current second-class medical certificate. External pilots may not perform observer duties while performing pilot duties.
8. All crewmembers including the PIC and visual observers must be qualified or under the direct supervision of a qualified instructor.
9. Use of visual observers in a linear fashion away from the control station (daisy chaining) is prohibited. Ground and airborne observers will ensure a positive transfer of observation duties between each other to ensure the PIC is informed and maintains situational awareness.
10. The PIC must ensure that any loss of command link, emergency, or malfunction of the UA will not cause the UA to enter Mexican sovereign airspace, given winds and heading. The UA must remain within the defined operating area.

11. Anytime a manned aircraft transmits a radio call within 10 miles of the airport, the UAS pilot will make radio contact with the aircraft to notify them of UAS operations. If a radio call is not transmitted by a manned aircraft and it is spotted by an observer or UAS pilot, the UAS pilot will attempt to establish radio contact with the aircraft. If radio contact is not established, a call in the blind will be transmitted. The minimum information relayed to the manned aircraft or in the blind is: call sign, size/type of UAS, location in reference to the airport, altitude, airspeed and intentions. Traffic pattern procedures and radio transmissions will be in accordance with the Aeronautical Information Manual and Army regulations as applicable to include but not limited to before taxiing, before taxiing onto the runway, ten miles out, entering the downwind, base leg, final approach, entering or leaving the runway, and takeoff or landing.
 12. Anytime a manned aircraft enters the airspace within 10 miles of the airport for any type of landing or takes off: all arresting cables must be removed from the runway prior to the manned aircraft's arrival. Additionally one of the following actions, whichever is appropriate, will be taken by the UAS pilot in conjunction with the proper radio transmissions. They are:
 - a. Delay the takeoff.
 - b. Immediately land the aircraft, and then remove arresting gear if time permits.
 - c. Depart the traffic pattern area, 1/2nm to the northwest, 1,000ft above traffic pattern altitude, and hold until the outbound, inbound, or transitioning manned aircraft has departed the airport area by 5nm or landed.
- NOTE: The paragraph above is only applicable to manned aircraft in the vicinity of Cochise College airport. This does not restrict UA operations based on manned aircraft operations located at another airport within the referenced ten miles.
13. Minimum time will be spent on the runway prior to take-off. All required run ups will be conducted prior to entering the runway for departure. Similarly, the landing arresting cables will only be on the runway for the minimum time required for landing and UA recovery. During multiple traffic pattern operations, cables may remain in place on the runway until a manned aircraft enters the runway or traffic pattern for takeoffs or landing.
 14. The US Army operational unit at Cochise College airport will have a Letter of Agreement with the owner/manager of Cochise College airport detailing UA operations usage, procedures, roles, and responsibilities.
 15. The US Army operational unit at Cochise College airport will coordinate its use of the COA defined airspace with Tombstone, Jackal and Morenci Military Operation Areas users, as appropriate, to deconflict operations in overlapping airspace. This Certificate of Waiver does not grant permission to use activated

Military Operations Areas (Tombstone, Jackal and Morenci MOA). MOA activation can be determined by contacting Albuquerque Center. UAS operations are not compatible with MOA activities and MARSAs cannot be accepted by MOA participants.

16. The use of cell phones or other telephonic communication is restricted to the operational conduct of the UA and any required communications with air traffic control (ATC).
17. A frequency integrity check must be conducted prior to the launch of the UA to ensure any electromagnetic interference does not adversely affect control of the UA.
18. Sterile-cockpit procedures must be observed during critical phases of flight. Crew Resource Management practices will be used during UA operations.
19. Chase operations will adhere to the following in addition to those provisions provided in the COA application:
 - a. Chase PIC will be trained in formation chase operations with emphasis on chasing slow moving aircraft.
 - b. Chase must maintain a safe distance from the UA should the UA experience a malfunction.
 - c. Chase must remain close enough to provide visual detection of conflicting aircraft in the path of the UA to advise the UA PIC of the situation.
 - d. Chase operations must be conducted during daylight hours only.
 - e. In-flight visibility must be 5 NM.
 - f. The chase pilot and observer must maintain direct radio voice contact with the UA pilot. The UA pilot will announce any abrupt or unplanned maneuvers with acknowledgement from the chase pilot prior to maneuver execution. For added safety, all UA maneuvers should be announced prior to execution.
 - g. In case of a catastrophic malfunction that may cause the UA to crash land, the chase pilot will provide headings or other information as needed to the UA pilot to ensure the UA is well clear of persons or property on the ground. This procedure will be used in lieu of providing planned termination points throughout the operations area.
 - h. Should the chase pilot and observer lose sight of the UA, the observer will immediately notify the UA pilot. The chase pilot will immediately ensure positive altitude separation, notify ATC, and then proceed to the nearest planned rejoin point. If the UA is not visually reacquired or rejoin not planned, the UA will execute lost link procedures returning the UA to the lost link waypoint for recovery. In all cases, notify ATC to ensure the best course of action is followed.
 - i. Should the chase pilot and observer lose communications with the UA pilot, the chase pilot and UA pilot will immediately notify ATC, and recover the UA

using lost-link procedures unless ATC instructs otherwise. If able, the chase aircraft will continue to chase the UA.

20. ZAB ARTCC may terminate or delay the provisions of this COA at any time it deems a sufficient level of safety for operations is not met.
21. Special provisions 1 and 11 will be used in lieu of maintaining direct two-way communications with ATC (Standard Provisions, bullet one).
22. The PIC must have at least a current FAA private pilot certificate or the FAA accepted agency equivalent, based on the application of 14 CFR Part 61 for any operations in class D or E and above 400' feet AGL in class G airspace or within 5 miles of any airport.

NOTAM: A distance (D) Notice to Airmen shall be issued when UA operations are being conducted. This requirement may be accomplished through your local base operations or NOTAM issuing authority. You may also complete this requirement by contacting 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 and provide:

- Name and Address of pilot filing NOTAM request
- Location, Altitude or the operating Area
- Time and nature of the activity

NOTE FOR PROPONENTS FILING THEIR NOTAM WITH DoD ONLY: This requirement to file with the AFSS is in addition to any local procedures/requirements for filing through DINS. The FAA Unmanned Aircraft Systems Office is working with the AFSS, and to eliminate the requirement to file a NOTAM with both the AFSS and DINS in the near future.

Incident / Accident and Normal Reporting Provisions: The following information is required to document routine and unusual occurrences associated with UAS activities in the NAS.

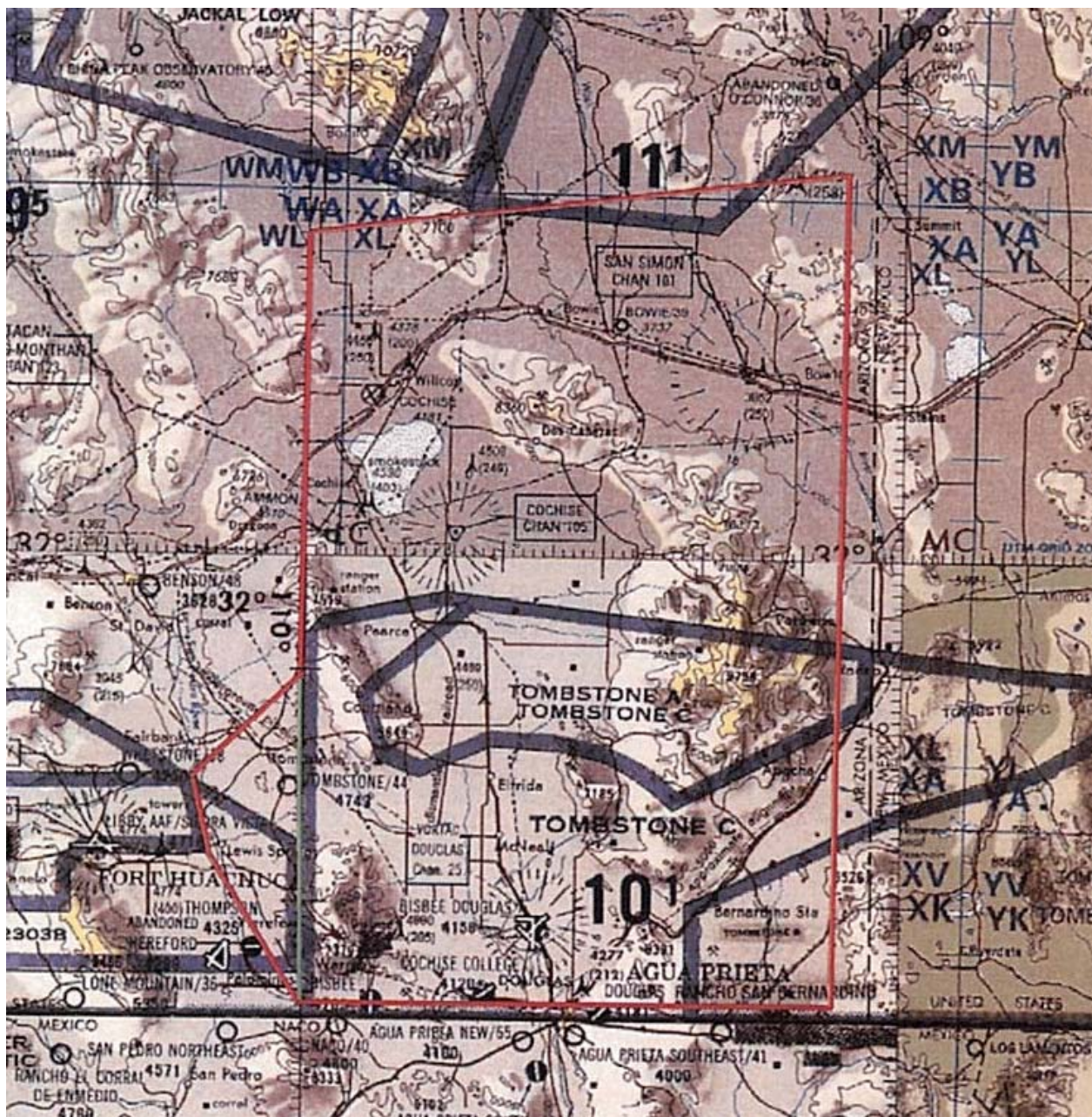
- The proponent for the COA shall provide the following information to Donald.E.Grampp@faa.gov on a monthly basis:
 - Number of flights conducted under this COA.
 - Pilot duty time per flight.
 - Unusual equipment malfunctions (hardware/software).
 - Deviations from ATC instructions.
 - Operational/coordination issues.
 - All periods of loss of link (telemetry, command and/or control)
- The following shall be submitted via COA Online, email or phone (202-385-4542, cell (b) (6) to Donald.E.Grampp@faa.gov within 24 hours and prior to any additional flight under this COA:

- All accidents or incidents involving UAS activities, including lost link.
- Deviations from any provision contained in the COA.

This COA does not, in itself, waive any Federal Aviation Regulation (FAR) 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 MQ-5B Hunter Unmanned Aircraft System in the operations area depicted in "Activity" above and attachment 1 below.

Attachment 1

Operating Area



Lost Link / Mission Procedures:

The Hunter Unmanned Aircraft System is operated with pre-established procedures in the event of link loss. If lost link occurs, the UAS will execute the programmed Return Home Data Coordinates, airspeed and altitudes are programmed/loaded into the aircraft's modular central processing assembly (MCPA) flight control computer and can be modified in flight, if required.

Programmed setting for Cochise College Operations is 2 sec for return home, (5 min for flightplan or hold loiter with continue loss of link will "NOT" be selected.) This means the AV will go return home in 2 seconds after loss of link.

NOTE: The UAS operator normally recovers the UAS upon receiving a LINK LOSS warning displayed on the UAS operator control console within the programmed time sequence. If link is not reestablished the UA executes RETURN HOME.

NOTE: During lost link the chase aircraft will remain with the UA until arrival at lost link recovery area providing necessary radio calls with dedicated observer. The chase aircraft is not released until the observer is in place and communication is established with the AVO who assumes all radio calls and has released the chase aircraft.

RETURN HOME parameters are:

In the event of Loss of Link/Return Home Point, the Hunter aircraft will fly the autonomous preprogram flight **at last programmed altitude to** a waypoint located one and one half mile North of Cochise College Airport (Figure 1), where the potential for reacquiring direct control of the aircraft is enhanced.

When the UA is operating within the boundaries of the present COA dimensions of 100 NM by 60 NM area of operation with appropriate Chase Plane and Qualified on-board Observer, **the return home plan will be loaded that maintains our assigned altitude at 60 KIAS**, until we are at the return home point and then spiral down in left hand turn not to exceed 15 degree bank angle in a 1300 meter orbit to 6200 ft MSL (2000ft AGL) until link is regained or the UA runs out of fuel, at which time the AV will automatically deploy the parachute.

Local pattern Link Loss-Return Home point is similar with the exception that the return home plan maintains pattern altitudes until reaching the return home point.

NOTE: There is ALWAYS a fully redundant ground control station operational/up and a standby operator ready to regain link with the AV if necessary, consisting of a separate One System Ground Control Station (OSGCS) and Ground Data Terminal (GDT) antenna that is always in the "hot" standby configuration ready to gain control should such an event occur.

The LOL/Return Home Point (Figure 1) overlays an uninhabited area that is flat terrain mitigating collateral damage to personnel and property. Additionally, the Hunter UAS has installed onboard a Flight Termination System (FTS) which is also preprogrammed prior to each flight to execute the parachute recovery system to safely recover the UA at the LOL/Return Home Point in the event that control is unattainable.

Figure 1

