

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION	
CERTIFICATE OF WAIVER OR AUTHORIZATION	
ISSUED TO	Oklahoma State University
ADDRESS	College of Engineering 218 Engineering North Stillwater, OK 74078
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	
OPERATIONS AUTHORIZED	Operation of the Maria, Anaconda, Skyhunter II and GD-40, Unmanned Aircraft System (UAS) in Class G and E airspace at or below 1500' above ground level (AGL) in the vicinity of Stillwater, Oklahoma under the jurisdiction of Kansas City ARTCC. See attachment 1.
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.	
The certificate 2017-CSA-165 is effective from November 18, 2017 to November 17, 2019 and is subject to cancellation at any time upon notice by the Administrator or his/her authorized representative.	
BY DIRECTION OF THE ADMINISTRATOR	
<u>FAA Central Service Area, AJV-C23</u> (Region)	<u>Vonnie L. Giles</u> (Signature)
<u>November 17, 2017</u> (Date)	<u>Tactical Operations Manager, CSA</u> (Title)

Purpose: To prescribe UAS operating requirements in the National Airspace System (NAS) for the purpose of Public Aircraft Operations.

Public Aircraft

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

STANDARD PROVISIONS

A. General.

1. 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 occur to policy, procedures, and regulatory requirements, limitation and conditions for UAS operations will be adjusted.
2. All personnel connected with the UAS operation must read and comply with the contents of this authorization and its provisions.
3. 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 conducted.
4. 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 a written notice of cancellation.
5. During the time this COA is approved and active, a site safety evaluation/visit may 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. Note: This section does not pertain to agencies that have other existing agreements in place with the FAA.
6. Frequency spectrum approval is independent of the COA process and requires the proponent to obtain certification and frequency assignments (licenses) from the National Telecommunications and Information Administration (NTIA) (47 CFR Part 300) or Federal Communications Commission (47 CFR Part 2, Subpart J and 47 CFR Part 87, Subpart D) and frequency licenses (47 CFR Part 87) when applicable for the control link, ATC radios, transponders, detect and avoid systems, and navigation systems used to support this COA. Equipment licensed under 47 CFR Part 5 (Experimental) or 47 CFR Part 15 (Radio Frequency Devices) does not provide the protection necessary for NAS operations.

B. Airworthiness Certification.

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

C. Operations.

1. Unless otherwise authorized as a special provision, a maximum of one unmanned aircraft will be controlled:
 - a. From a single control station, and
 - b. 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 Part 91 §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: Flight Crew Member (UAS). In addition to the flight crew members identified in 14 CFR Part 1, Definitions and Abbreviations, an Unmanned Aircraft System flight crew members include pilots, sensor/payload operators, and visual observers and may include other persons as appropriate or required to ensure safe operation of the aircraft.

3. Operations (including lost link procedures) should not be conducted over populated areas, heavily trafficked roads, or an open-air assembly of people, unless the Airworthiness Certification does not restrict these operations.
4. When necessary, transit of airways and routes must be conducted as expeditiously as possible. The unmanned aircraft should not plan to loiter on Victor airways, jet routes, Q and T routes, IR routes, or VR routes.
5. For flights operating on an IFR clearance, the PIC must ensure positional information in reference to established National Airspace System (NAS) fixes, NAVAIDs, and/or waypoints are provided to ATC. The use of latitude/longitude positions is not authorized, except oceanic flight operations.
6. 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 §91.209.
7. Unless installed as part of a Detect and Avoid (DAA) system, the use of a Traffic Collision Avoidance System (TCAS) in Traffic Advisory (TA) or Traffic

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Advisory/Resolution Advisory (TA/RA) modes while operating an unmanned aircraft is prohibited.

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

E. Safety of Flight.

1. The operator 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. When operating in controlled airspace, 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. Lost link programmed procedures will avoid unexpected turn-around and/or altitude changes and will provide sufficient time to communicate and coordinate with ATC prior to executing any lost link maneuver. The initial Lost Link Procedure should include the last assigned/coordinated heading and altitude unless otherwise coordinated.
4. See-and-Avoid.

Unmanned aircraft have no on-board pilot to perform see-and-avoid responsibilities; therefore, when operating in the National Airspace System provisions must be made to provide an alternate means of compliance to 14 CFR Part 91 §91.113.

- a. The operator and/or delegated representatives are 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 other aviation activities and the 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 PIC.
- d. Visual or tactical observers must be used at all times except in Class A airspace, active restricted areas, and warning areas designated for aviation activities or as authorized in the Special Provisions.

(1) Observers may either be ground-based or airborne in a chase plane.

- (2) If the chase aircraft is operating more than 100 feet above/below and/or more than $\frac{1}{2}$ NM laterally of the unmanned aircraft, the chase aircraft PIC will advise the controlling ATC facility.
- e. The PIC is responsible to ensure visual observers are;
 - (1) Able to see the aircraft and the surrounding airspace throughout the entire flight, and
 - (2) Able to provide the PIC with the UA's 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 14 CFR Parts 91 § 91.111, §91.113 and § 91.115, and
 - (b) Prevent the UA from creating a collision hazard, and
 - (c) Comply with all conditions of this COA.
- f. 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.
- g. A PIC may rotate duties as necessary to fulfill operational requirements; a PIC must be designated at all times.

F. Notice to Airmen (NOTAM).

1. A Distant (D) NOTAM must be issued when unmanned aircraft operations are being conducted unless operations are contained within Class A airspace, active restricted or warning areas or operating areas that are designated on the appropriate aeronautical chart or airport directory. This requirement may be accomplished:
 - a. Through the operator's local base operations or NOTAM issuing authority, or
 - b. By contacting the Lockheed Martin Flight Service Station NOTAM Office 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 contact information of the pilot filing the NOTAM request
 - (2) Location, altitude, or operating area
 - (3) Time and nature of the activity.
2. For operators 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).

G. Reporting Requirements

1. Documentation of all operations associated with UAS activities is required regardless of the airspace in which the UAS operates. NOTE: Negative (zero flights) reports are required.

2. The Proponent must submit the following information on a monthly basis through COA On-Line:

- a. Name of Proponent, and aircraft registration number,
- b. UAS type and model,
- c. All operating locations, to include city name and latitude/longitude,
- d. Number of flights (per location, per aircraft),
- e. Total aircraft operation hours,
- f. Takeoff or landing damage, and
- g. Equipment malfunction. Required reports include, but are not limited to, failures or malfunctions to the:
 - (1) Control station
 - (2) Electrical system
 - (3) Fuel system
 - (4) Navigation system
 - (5) On-board flight control system
 - (6) Power plant
- h. The number and duration of lost link events (control, performance and health monitoring, or communications) per UAS, per flight.

3. Incident/Accident/Mishap Reporting

After an incident or accident that meets the criteria below, and within 24 hours of that incident, accident or event described below, the proponent must provide initial notification of the following to the FAA via email at mail to: 9-AJV-115-UASOrganization@faa.gov and via the UAS COA On-Line forms (Incident/Accident).

- a. All accidents/mishaps involving UAS operations where any of the following occurs:
 - 1) Fatal injury, where the operation of a UAS results in a death occurring within 30 days of the accident/mishap
 - 2) Serious injury, where the operation of a UAS results in:
 - Hospitalization for more than 48 hours, commencing within 7 days from the date of the injury was received;
 - A fracture of any bone (except simple fractures of fingers, toes, or nose);
 - Severe hemorrhages, nerve, muscle, or tendon damage;
 - Involving any internal organ; or
 - Involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.
 - 3) Total unmanned aircraft loss

- 4) Substantial damage to the unmanned aircraft system where there is damage to the airframe, power plant, or onboard systems that must be repaired prior to further flight
- 5) Damage to property, other than the unmanned aircraft.
- b. Any incident/mishap that results in an unsafe/abnormal operation including but not limited to
 - 1) A malfunction or failure of the unmanned aircraft's on-board flight control system (including navigation)
 - 2) A malfunction or failure of ground control station flight control hardware or software (other than loss of control link)
 - 3) A power plant failure or malfunction
 - 4) An in-flight fire
 - 5) An aircraft collision involving another aircraft.
 - 6) Any in-flight failure of the unmanned aircraft's electrical system requiring use of alternate or emergency power to complete the flight
 - 7) A deviation from any provision contained in the COA
 - 8) A deviation from an ATC clearance and/or Letter(s) of Agreement/Procedures
 - 9) A lost control link event resulting in
 - Fly-away, or
 - Execution of a pre-planned/unplanned lost link procedure.
- c. Initial reports must contain the information identified in the COA On-Line Accident/Incident Report.
- d. 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.
- e. 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.
- f. For other than Department of Defense operations, 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.

AIR TRAFFIC CONTROL SPECIAL PROVISIONS**A. Coordination Requirements.**

1. PIC shall issue a NOTAM for the operating area(s) at least 24 hours prior to operations. The Marina Mesonet area shall be described as a .5 NM radius of the SWO207012, and the OSU Flight Station shall be described as a 1 NM radius of the SWO100013.

B. Communication Requirements.

1. Two-way radio communications are not required.

C. Emergency/Contingency Procedures.

1. Lost Link Procedures:

In the event of a lost link, the UAS pilot will comply with the following provisions Kansas City ARTCC Flint Hills Area Supervisor at 913-254-8510:

- a. If the autopilot fails and/or aircraft departs from its programmed flight path, the PIC will assume control of the aircraft utilizing RC controls and immediately land the aircraft. Loss of GPS signal in flight will terminate the flight by sending the aircraft into a predetermined pattern after 5 seconds to attempt to reacquire the signal. The aircraft will enter a moderate bank angle, reduce throttle to zero and orbit to the ground.
 - (1) The launch point will be programmed into the vehicle and will be used as the home point based on its current mission being flown. The Home, Launch and Recovery point for all vehicles remain within the COA operating area.
- b. 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 or coordination with ATC has occurred.
- c. The unmanned aircraft lost link mission should minimize transit or orbit over populated areas.
- d. Lost link programmed procedures will avoid unexpected turn-around and/or altitude changes and will provide sufficient time to communicate and coordinate with ATC.
- e. Lost link orbit points shall not coincide with the centerline of Victor airways.

2. Lost Communications:

If the pilot-in-command (PIC) or the visual observer lose sight of the UA or communications with each other, the PIC will recover the UA immediately using the lost link procedure. If communications and/or the UA is reacquired visually during the recovery, the PIC may determine whether or not to continue the flight.

3. Emergency/Fly-Away Procedures:

- a. In the event of an emergency, the PIC will immediately contact the ATC facility having jurisdiction for the airspace, state the nature of emergency and pilot intentions.
- b. In the event of a UA fly-away, advise ATC of the following:

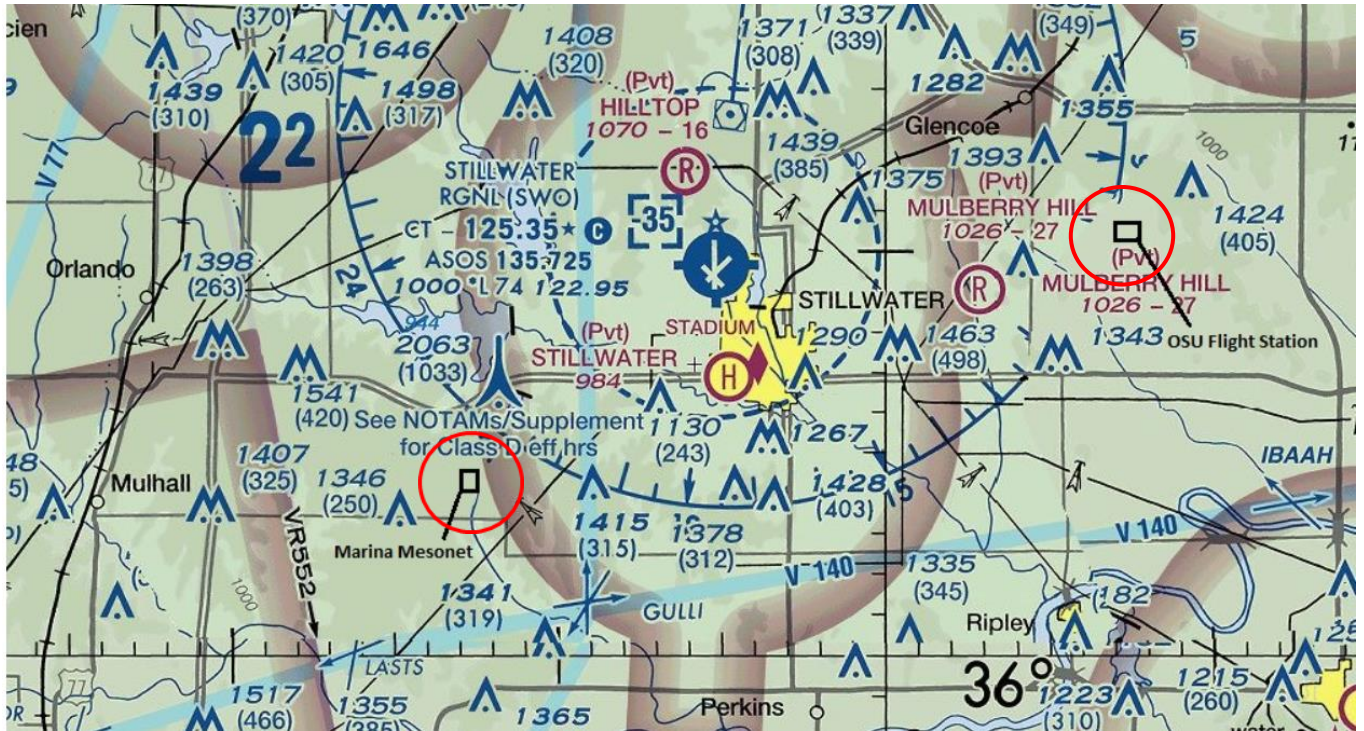
- (1) Direction of flight
- (2) Last know altitude
- (3) Maximum remaining flight time

D. Operations Area: (See Attachment 1)

AUTHORIZATION

This Certificate of Waiver or Authorization does not, in itself, waive any Title 14 Code of Federal Regulations not specifically stated, 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 proponent to resolve the matter. This COA does not authorize flight within Temporary Flight Restrictions, Special Flight Rule Areas, regulatory Special Use Airspace or the Washington DC Federal Restricted Zone (FRZ) without pre-approval. The proponent is hereby authorized to operate small Unmanned Aircraft System in the NAS within the areas defined in the Activity section of this attachment.

Operations Area



OSU Flight Station

Point	Latitude	Longitude
1	360958N	965013W
2	360958N	964940W
3	360932N	964940W
4	360932N	96 5013W
Home	360942N	964958W

Marina Mesonet

.5 NM Radius of 36-9-42N/96-50-8W