

USDA-ARS policy on the use of Unmanned Aircraft System (UAS)

I. PURPOSE:

The USDA-ARS's small unmanned aircraft system ("sUAS") program is established to assist in Agriculture Research Services. This policy sets forth how the sUAS program will operate the aircraft in coordination with Agriculture Research Services. This policy is designed to minimize risk to aircraft, property and people during the operation of the sUAS.

II. DEFINITIONS:

- a. Mission Commander - The individual responsible for reviewing and approving the use of the sUAS.
- b. Observer – The individual trained to assist the pilot in command in carrying out all duties required for the safe operation of the sUAS.
- c. Pilot in Command – The individual responsible for the overall flight operations of a specific mission. The pilot in command has final authority as to all flight operational issues, including the final go/no-go decision.
- d. Program Manager - The individual responsible for managing all aspects related to the use of sUAS.

III. POLICY:

- a. Aircraft:
 - i. Airworthiness – The Mission Commander shall be responsible for ensuring that the UAS is airworthy prior to each mission. The Mission Commander may rely upon the inspection and reports provided by agency personnel responsible for maintaining the UAS. In addition, the Mission Commander may rely upon the testing data and evaluation data provided by other government agencies, the aircraft manufacturer, and consultant.
 - ii. Maintenance – All maintenance shall be performed by agency personnel specifically trained on the maintenance of the UAS or by manufacturer certified representatives and personnel. The UAS will undergo a preflight and post flight inspection. Any squawks or discrepancies will be entered in the aircraft's log and reported to the sUAS program manager. It shall be the responsibility of the sUAS program manager and Mission Commander to determine whether the reported squawks or discrepancies need to be corrected prior to the next flight.
 - iii. Storage – the sUAS shall be stored in a secure location accessible only by sUAS program participants. The unit shall be stored in a secure manner to limit possible damage to the unit while in transit. The system should be stored in temperatures from 60 degrees to 80 degrees, with limited moisture and covered conditions. The system should also be stored in a manner to limit dust and dirty conditions.
 - iv. Battery Charge – Any components necessitating a charged battery shall be charged in accordance with manufacturer's recommendations. To the extent permitted by manufacturer's recommendations, the sUAS shall be fully charged when not in use.

b. Pilot:

i. All pilots who will be flying the sUAS shall be properly trained by either manufacturer representatives or individuals designated by the sUAS Program Manager. When operating within Class C airspace, the pilot of the sUAS will have an FAA airman certificate with appropriate medical clearance to assure eye sight to the standard for a second-class medical certificate. When operating outside of Class C airspace, the pilots will have at least passed an FAA airman knowledge exam and have appropriate medical clearance to assure eye sight to the standard for a second-class medical certificate. The pilots will have a current working knowledge of the airspace intended for operations, air traffic control communication requirements, specific sUAS aerodynamic factors, and the ability to obtain and interpret weather.

ii. Currency Training:

1. Pilots: All pilots must have 3 flight hours and 6 launch and recoveries in the preceding 90 days in UAS model to be eligible for a USDA-ARS sUAS mission.

Each pilot must undergo re-currency training every 12 months. Re-currency training shall include:

- a. Assembly and Disassembly
- b. Launching and Recovery
- c. Review of Relevant FAA Regulations
- d. Emergency Operations
- e. Low Altitude Operations
- f. Manual Operations
- g. Surveillance Patterns
- h. Weather

c. Observer:

i. Observer Required: An observer is required for all missions.

ii. Observer Experience: All observers must participate in the preflight briefing, which shall include but not be limited to a review of mission goals and methods to accomplish those goals, review of communication procedures, and a review of emergency procedures. The observer will receive specific training on relevant Part 91 regulations, such as the obligation to see and avoid other aircraft and the ability to identify position for purposes of relaying position reports for other types of aircraft.

d. Operational Conditions:

i. Line of Sight: All operations shall be conducted within line of sight of the Pilot or Observer such that the Pilot or Observer may detect and avoid hazards such as property and aircraft.

ii. Weather: All flights will be conducted in VFR weather. Flight may not be conducted in known icing conditions.

1. Heat: The operational guidelines for heat are less than 110 degrees Fahrenheit. Operation in temperatures over this mark should be noted with the air density as

noted from the most current conditions found at an airport facility. The battery and length of flight should be adjusted accordingly based upon high humidity and temperature with air density.

2. Wind: The operational guidelines for wind are less than 25 MPH at the surface. Operation in wind conditions over this mark should be noted from the most current conditions found at an airport facility. The pilot in command may also utilize a hand held anemometer.
3. Rain, Snow and Fog: The operational guidelines for these conditions are based upon visibility and operator safety at the local site. The primary pilot and safety operators must adhere to the Line of Sight and VFR.

iii. Night Flight: Night flight is prohibited unless specifically authorized by the FAA.

IV. FLIGHT REQUIREMENTS:

- a. Mission Request: all requests for sUAS flight are submitted to the Program Manager. The Program Manager shall discuss the proposed mission with the Mission Commander. Such discussion will consider the following:
 - i. The location of the mission for purposes of insuring the safety of people and property;
 - ii. The intended area of operation for purposes of evaluating the ability to mitigate potential air to air conflicts. Such evaluation will take in consideration the current landing patterns at airports in the vicinity. Whenever the approach path of an airplane to a nearby airport would involve flying over the intended area of operation, such operations shall be coordinated with the appropriate air-traffic control facility.
 - iii. The weather and its potential effect on the aircraft, including the ability to carry the aircraft to a potential area of high air to air conflict.
 - iv. The currency of the proposed pilot and observer.
 - v. The potential usefulness of the information gathered by the sUAS versus information gathered through other means.
 - vi. Any other relevant risk factors to successfully complete a risk benefit analysis for the use of sUAS.
- b. Once the Program Manager has approved the mission request, the Mission Commander will select the pilot and observer and coordinate with individuals requesting the mission.
- c. Preflight Preparation: Before any mission the pilot must conduct a preflight briefing (See Attached Form). The briefing shall include the following:
 - i. Identification of mission purpose.
 - ii. Identification of individuals participating in the mission regardless of whether they are aircraft or ground support.

- iii. Identification of mission limitations, including weather limitations and flight time limitations.
 - iv. Identification of flight area, including maximum ceiling and floor.
 - v. Coordination of communication procedures between Pilot and Observer and Aircraft and ground support.
 - vi. Emergency Operations including review of aircraft system failure and lost link.
- d. Scene Review: The Pilot and Safety team is responsible for securing and identification of all safety items at the scene. These include:
- i. Take-off and landing site: This area needs to be free of obstructions, items on the ground and debris that may interfere with the rotors. This includes creation of a flight line to adequately segregate non sUAS mission personnel.
 - ii. Flight perimeter: The site must utilize observers and standard protocols to minimize civilian traffic or interference during the operation.
 - iii. Safety View: The flight team should identify trees, bushes, power lines, and other potential obstructions and coordinate the preflight briefing accordingly.
 - iv. Interference: The flight team should identify Cell Towers, TV and Microwave sources, which might create interference with the flight equipment. The equipment should be tested on the ground to insure proper communications and operation before the flight.
- e. ATC notification: The pilot shall notify the appropriate air-traffic control facilities in advance as early as possible. Such notification should include the following:
- i. The intended location of the flight,
 - ii. The intended duration of the flight,
 - iii. The maximum altitude of the flight, and
 - iv. The cell phone of two individuals for emergency contact.
 - v. The pilot shall request a specific transponder code to be utilized during the flight.
 - vi. The pilot shall notify air-traffic control immediately at the conclusion of the flight.
- f. Communications: The pilot and/or the observer shall have a VHF radio capable of transmitting position reports to nearby aircraft. It shall be the responsibility of the pilot and/or the observer to monitor local communication frequencies to assist in de-conflicting the sUAS from other aircraft.
- g. Flight operations: All flight operations shall be conducted in accordance with the manufacturer's manual. If any time the pilot and/or observer believe there is a potential for air to air conflict, risk of harm to individuals or property, the pilot shall immediately land the aircraft. In the event of loss communications with the aircraft, aircraft shall fly to a predetermined location and land. If

the aircraft does not immediately execute these orders, the pilot or observer shall immediately notify air-traffic control.

V. REPORTING:

- a. The Mission Commander shall be responsible for logging all flights. The flight log should include the following:
 - i. The name of the pilot,
 - ii. The name of the observer,
 - iii. The area of operations,
 - iv. The duration of the flight, and
 - v. Any unusual circumstances (including loss of link or aircraft damage).
- b. Reporting incidents or accidents: the Mission Commander shall also be responsible for reporting any incidents or accidents to the local Flight Standards District Office.

Appendix A – Flight Checklist (STICKS – Without Ground Station)

Flight Checklist

- Check all Battery Voltages for accurate flight voltages
 - Flight Control Batteries – 12.4 Volts or Higher
 - Main Batteries – 25.1 Volts or Higher
- Check all mechanical linkages, joints, and mechanical elements
- Check Main and Tail Blades for any issues by hand
- Turn JR Radio 'On'
- Connect only the Flight Control Batteries for the Autopilot
- Turn on the Power Switch for the autopilot on the electrical panel
- Read and watch the LCD as it boots up and walks through checklist
 - Power – The system will insure power and proper voltage
 - Communication – The system will insure Wireless connectivity and signal strength
 - GPS – The system will look for Usable and Visible GPS satellites and show counter
 - Magnetometer – The system will look for proper connectivity of the Magnetometer
 - Laser Altimeter – The system will look for proper connectivity of the Laser Altimeter
- The system will give a Final – Solid BLUE LED that indicates FULLY STABLE and full GPS lock of greater than 5 satellites. The system will also indicate the number of Visible and Usable satellites and a PDOP rating
- (Safety Pilot) Swing tail of the Helicopter - Verify dual gyro gain operation with autopilot when the tail rotors counteract the inertial movement
- (Safety Pilot) Connect Main Power Batteries via quick connects, and pilot moves away from the Helicopter.
- Insure that all personnel are behind the Flight line, and announce that the Vehicle is 'Hot'
- Check for aircraft traffic and make any radio calls mandated by air traffic control and communicate to Safety Team.
- Pilot in Command - TURN ROTORS ON
- Once the Rotors are at a stable RPM Helicopter Takeoff and start watch or timer.

Appendix A – Flight Checklist (GCS – With Ground Control Station)

Note: Software Windows and Menu Items in brackets ()

Flight Checklist

- (Map>Right Click) Configure flight map with appropriate altitudes, LAT/LONG as required for the mission.
- Verify and/or load flight plans (Check Altitude on WGS or AGL to insure location limits)
- Click Engine 'KILL ENGINE' before approaching Heli to ensure the motors are off before approaching the vehicle
- Turn JR Radio 'On'
- Change 'Flight Mode' in tool bar to NONE
- Verify GPS 'Halo' and 'Helicopter' Icons are in relative map area expected (If not Check Window>Telemetry GPS)
- Right Click on 'Helicopter' Icon >'View Waypoints' and validate that all GPS coordinates are in the proper sequence and order
- (Window>Status>System) Verify Voltage of Helicopter Flight Control System Battery (~12 V)
- (Window>ground station) Verify GPS Count for the Ground Station, check number of satellites and PDOP. Request Radio settings to insure communications from the Helicopter
- (Same) Verify Ground station is on AC power (>14 V) or Battery has sufficient voltage for flight (11 > v)
- (Window>Status>Telemetry) Verify Helicopter is seeing same number of satellites and PDOP
- (Window>Status>Telemetry) Lift the Helicopter and watch the altitude section to see the Laser Altimeter is operating properly
- (Window>Preflight>Mission Limits) Identify the
 - Maximum Height and Minimum Height are set below 300 Ft, and above the terrain minimum
 - Identify Flight Termination logic for Rotor cutoff of Loss of GPS and Communications
 - Set the GPS point for Lost Communications Automatic Landing (Lat/Long) and initial and final landing logic
- (Window>Preflight>Command Loop) Check and Verify Command Loop Settings (typically all auto). Identify the forward speed (2 M/S) and also the first GPS waypoint
- (Window>Preflight Checklist with Safety Pilot) Pick up the helicopter and check pitch, rolling, collective and yawing by verifying the artificial horizon on the Ground Station reacts accordingly.
- (Physical Test) Tilt forward, backward, lift up for artificial horizon responds
- (Safety Pilot) Swing tail of the Helicopter - Verify dual gyro gain operation with autopilot when the tail rotors counteract the inertial movement
- (Safety Pilot) Connect Main Power Batteries via quick connects, and pilot moves away from the Helicopter.
- Insure that all personnel are behind the Flight line, and announce that the Vehicle is 'Hot'
- Click Engine 'On' in the Ground Station
- Check for aircraft traffic and make any radio calls mandated by air traffic control.
- Click 'LAUNCH NOW', Heli goes to spool up and take off
- (Safety Pilot) TURN ROTORS ON after heli is spooling
- Helicopter Takeoff and start watch or timer.