

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
CERTIFICATE OF WAIVER

ISSUED TO

ERAU UAS-S Research
Responsible Person: Nickolas Macchiarella
Waiver Number: 107W-2023-00822

ADDRESS—

Embry-Riddle Aeronautical Univ., Aero Sci, UAS-S
1 Aerospace Blvd.
Daytona Beach, FL 32114

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 provisions contained in this certificate.

OPERATIONS AUTHORIZED

Small unmanned aircraft system (sUAS) operations beyond the visual line of sight of the remote pilot in command (PIC); Small unmanned aircraft system (sUAS) operations in which a participating Visual Observer (VO) is not able to see the unmanned aircraft.

LIST OF WAIVED REGULATIONS BY SECTION AND TITLE

14 CFR §§ 107.31—Visual line of sight aircraft operation, and
107.33(b) & (c)(2)—Visual observer

STANDARD PROVISIONS

1. A copy of the application made for this certificate shall be attached to and become a part hereof.
2. This certificate shall be presented for inspection upon the request of any authorized representative of the Administrator 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 Nos. 1 to 35, inclusive, are set forth on the attached pages.

This Certificate of Waiver is effective from July 13, 2023, to July 31, 2027, and is subject to cancellation at any time upon notice by the Administrator or an authorized representative.

BY DIRECTION OF THE ADMINISTRATOR

General Aviation and Commercial Division, AFS-800

SPECIAL PROVISIONS ISSUED TO ERAU UAS-S Research

General.

The FAA's Flight Standards Service has reviewed your application to ensure compliance with the requirements of 14 CFR § 107.200 and § 107.205. Pursuant to these authorities, the Administrator finds that the proposed small unmanned aircraft (sUA) operation can be conducted safely under the provisions of this Certificate of Waiver (Waiver) as listed below because you have established adequate mitigations for risks involved with operating your sUA in the manner you described. Adherence to the provisions of this Waiver establishes the required level of safety within the national airspace system.

The Administrator may cancel this Waiver at any time. As a general rule, this Waiver 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 any provision listed below is a violation of the terms of this Waiver and will serve as justification for cancellation.

List of Regulations Waived by Section and Title. The following regulations are waived:

14 CFR § 107.31, Visual line of sight aircraft operation, is waived to allow operation of the small unmanned aircraft (sUA) beyond the direct visual line of sight of the remote pilot in command (PIC);

14 CFR § 107.33(b) & (c)(2), Visual observer, is waived to the extent necessary to allow operation of the small unmanned aircraft (sUA) when any Visual Observer (VO) who is participating in the operation may not be able see the unmanned aircraft in the manner specified in § 107.31.

No part of this waiver will function as an airspace authorization under 14 CFR § 107.41. The FAA's Air Traffic Organization responds directly to requests for such authorizations.

Common Special Provisions. The Responsible Person is directly responsible for safety of operations conducted under this Waiver and will ensure the Remote Pilot in Command (remote PIC), manipulator of the controls, and visual observer(s) (VO)¹ comply with all provisions of this Waiver.

1. The Responsible Person listed on the Waiver is responsible to the FAA for the safe conduct of the operations. Prior to conducting operations that are the subject of this Waiver, the Responsible Person:
 - a. Must ensure the remote PIC, manipulators of the controls, and VO(s) are informed of the terms and provisions of this Waiver and strictly observe the terms and provisions herein;
 - b. Must ensure the remote PIC, manipulators of the controls, and VO(s) are informed and familiar with part 107 regulations; and
 - c. Evidence of the above (a and b) must be documented and must be presented for inspection upon request from the Administrator or an authorized representative;
2. This Waiver may not be combined with any other waiver(s), authorization(s), or exemption(s) without specific authorization from the FAA;
3. The FAA has the authority to cancel or delay any or all flight operations if the safety of persons or property on the ground or in the air are in jeopardy or there is a violation of the terms of this Waiver;
4. A copy of this Waiver must be accessible and available to the remote PIC at the ground control station during sUA operations that are the subject of this Waiver;

¹ Title 14 CFR § 107.3 defines the term "visual observer." Any VO participating in operations conducted under this Waiver must meet the requirements listed in § 107.33 throughout the duration of flight operations.

5. The Responsible Person listed on this Waiver must maintain a current list of pilots by name and remote pilot certificate number used in operations under this Waiver. This list must be presented for inspection upon request from the Administrator or an authorized representative;
6. The Responsible Person listed on this Waiver must maintain a current list of sUA by registration number(s) used in operations under this Waiver. This list must be presented for inspection upon request from the Administrator or an authorized representative;
7. For the purposes of this Waiver, direct participants are the remote PICs, persons manipulating the controls, VOs, and any persons whose involvement is necessary for safety of the sUA operation. All other persons are considered non-participants;

Waiver Specific Special Provisions. sUAS operations beyond the visual line of sight (BVLOS) of the remote PIC and VO(s) may be conducted under this waiver when the operation complies with the following provisions:

OPERATIONAL PROVISIONS

8. All operations under this waiver must use one or more VO;
9. Operations may not be conducted at night, as defined in 14 CFR § 1.1;
10. Individuals directly participating in the operation of the sUAS must be easily identifiable visually (e.g., apparel, safety vests);
11. The remote PIC must ensure sufficient VO(s) are used to identify any non-participating aircraft prior to their entry into the planned operational area. For the purpose of this Waiver, sufficient VO(s) is defined as the minimum number of VO(s) required to continuously observe at least a 2 statute mile radius of airspace surrounding the sUA in flight. The remote PIC must confirm VO(s) are physically located such that the remote PIC receives sufficient notice to ensure the UA remains well clear of all other aircraft;
12. Prior to operations, the Responsible Person must develop an operations manual that contains at least the following items:
 - a. Operator name, address, and telephone number,
 - b. Method of manual distribution and revision,
 - c. Certificate of Waiver. The operations manual must include a copy of the current Waiver(s),
 - d. Aircraft description and limitations list by aircraft type and model,
 - e. Method to ensure safety of non-participating persons and aircraft,
 - f. Safety briefing of Direct Participants,
 - g. Direct Participant minimum requirements,
 - h. Method of communications,
 - i. Normal operating procedures,
 - j. Abnormal operating procedures,
 - k. Emergency procedures,
 - l. Crew Resource Management,
 - m. Risk management, and
 - n. Accident Notification. The operations manual must contain procedures for notification and reporting of accidents in accordance with 14 CFR § 107.9 and NTSB 830;
13. The Responsible Person must ensure a copy of the current operations manual is available to the remote PIC and all other direct participants prior to and during sUAS operations that are the subject of this Waiver;

14. The Responsible Person must ensure all operations conducted under this Waiver follow the procedures outlined in the current operations manual. If a discrepancy exists between the provisions in this Waiver and the procedures outlined in the operations manual, the provisions of this Waiver take precedence and must be followed;
15. The Responsible Person may update or revise its operations manual. The Responsible Person must track such revisions and present revised documents to the Administrator or an authorized representative upon request. The Responsible Person must also present revised documents when applying for extension of or amendment to this Waiver. If any revision to the manual would be contrary to the information provided in the waiver application or obviate a condition or limitation of this waiver, then the Responsible Person must apply for an amendment to this Waiver;
16. The Responsible Person must ensure each remote PIC who will conduct operations under this Waiver is trained in a manner that addresses the items listed in § 107.49(a)-(e) and in a manner that is consistent with how the sUAS will be operated under this Waiver. All training and demonstration for all remote PICs and VOs must be documented and made available upon request by the Administrator or an authorized representative. Training operations may only be conducted under the standard requirements of part 107 (without waiver). The training must include:
 - a. sUA limitations,
 - b. sUA programming,
 - c. sUA operational procedures,
 - d. Abnormal procedures,
 - e. Air traffic avoidance procedures,
 - f. Crew Resource Management,
 - g. sUA flight training, and
 - h. Demonstration of sUA ground and flight skills;
17. Prior to operations under this Waiver, all direct participants must attend a safety briefing that addresses at minimum, the following items:
 - a. Designated positions, physical locations, responsibilities, and Crew Resource Management,
 - b. Planned flight operating area,
 - c. Designated launch and recovery areas,
 - d. Verification of geo-fence boundaries,
 - e. Verification of return home and land flight profile, and course,
 - f. Verification of emergency landing site(s), land profile, and course,
 - g. Procedures for avoidance of other aircraft,
 - h. Procedures for operating under this Waiver;
18. Communication between the remote PIC and VO must occur to facilitate, when necessary, the remote PIC taking action to maneuver the sUA with sufficient time to:
 - a. Give way to all other aircraft in accordance with § 107.37,
 - b. React to any unforeseen operational or mechanical failure without creating a hazard to other people, other aircraft, or property in the event of a loss of control of the sUA, and
 - c. Maintain compliance with this Waiver and the requirements of part 107;
19. Operations subject to this waiver must cease as soon as possible in a manner that does not jeopardize the safety of human beings, property or other aircraft, if, at any time:
 - a. Safety of human beings or property on the ground or in the air is in jeopardy,
 - b. Any failure to comply with the provisions of this Waiver exists,
 - c. Full-duplex communications cannot be maintained between the remote PIC and any VO participating in the operation,
 - d. A non-participating aircraft enters the designated flight operating area,
 - e. GPS signal is lost, or
 - f. sUA GPS location information is degraded;

20. No sUA flight that occurs under this waiver may carry the property of another for compensation or hire;
21. Not less than 24 hours prior to conducting operations that are the subject of this Waiver, a Notice to Air Missions (NOTAM) must be filed. The NOTAM must include location, altitude, and/or operating area, and the time and nature of the activity;

TECHNICAL PROVISIONS

22. Operations conducted under this Waiver may only occur with the make and model sUAS described in the waiver application proposed operations of any other manufacturer, make or model of sUAS will require a new waiver application or a request to amend this Waiver;
23. All sUAS operations conducted in accordance with this Waiver must comply with all manufacturer recommendations and limitations for the sUAS;
24. The Responsible Person must maintain each sUAS and its components in accordance with manufacturer's instructions and recommendations. sUAS maintenance includes scheduled and unscheduled overhaul, repair, inspection, modification, replacement, and system software upgrades of the sUAS and its components necessary for flight. A log of all maintenance performed must be kept for each aircraft operated under this waiver. This log must be available to the remote PIC for review prior to conducting operations that are the subject of this waiver. Each sUAS maintenance log must be presented to the Administrator when requested. The log must contain the following information for each maintenance activity:
 - a. A description (or reference data acceptable to the Administrator) of work performed,
 - b. The date of completion of the work performed,
 - c. The name of the person who performed the work, and
 - d. The signature of the person who performed the work;
25. Any sUAS that has undergone maintenance must undergo a functional test flight prior to conducting operations under this Waiver. A log entry must be made for each functional test flight. The log entry must contain at minimum the:
 - a. Calendar date,
 - b. sUA registration number,
 - c. Remote PIC who performed the functional test flight,
 - d. Duration of the flight, and
 - e. The result of the functional flight test;
26. A functional test flight may only be conducted under the standard requirements of part 107 (without waiver);
27. The sUA must be equipped with high visibility markings and lighting to increase the conspicuity of the sUA to 1 statute mile for daytime operations and 3 statute miles for night operations;
28. The sUAS ground control station must display in real time the following information: sUA altitude, sUA position, sUA direction of flight, and sUAS flight mode, as described in the waiver application. This information must be available at all times to the remote PIC;
29. The sUAS must audibly and visually alert the remote PIC of degraded system performance, sUAS malfunction, or loss of Command and Control (C2) link between the ground control station and the sUA;

30. Prior to conducting operations under this Waiver, the remote PIC must determine all control links used in the sUAS, will maintain the ability to control the sUA at the maximum planned distance for the proposed operation. At all times during operations that are the subject of this Waiver, the remote PIC must maintain the ability to direct the sUA to ensure compliance with the applicable provisions of this waiver;
31. If the remote PIC loses command or control link with the sUA, the sUA must follow a predetermined route to immediately reestablish command and control link. If command and control link is not immediately reestablished and the remote PIC no longer has the ability to direct the sUAS to ensure compliance with applicable provisions of part 107, the sUA must follow the loss of command and control procedure as described in the waiver application;
32. If communication between the VO and the remote PIC will occur by electronic device:
 - a. The device must be continuous full-duplex,
 - b. The remote PIC must be able to use the device hands-free, and
 - c. There must be a reliable back-up communication method;
33. ADS-B out (1090/978 MHz) may not be transmitted from the sUAS when operating pursuant to this Waiver;
34. All emitters used in sUAS must be in compliance with all applicable FCC regulations and all provisions of the FCC authorization granted for the emitter. A FCC experimental authorization may not be used for sUAS operations under this Waiver; and

ENVIRONMENTAL PROVISIONS

35. Operations conducted under this Waiver are limited to the location described in the waiver application.