U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

CERTIFICATE OF WAIVER

ISSUED TO

Keith Miao
Responsible Person: Keith Miao
Waiver Number: 107W-2020-04154

ADDRESS –

1755 Tulane Ave
East Palo Alto, CA 94303

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) in lieu of visual line of sight (VLOS).

LIST OF WAIVED REGULATIONS BY SECTION AND TITLE

14 CFR § 107.31—Visual line of sight aircraft operation,

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 38, inclusive, are set forth on the attached pages.

This Certificate of Waiver is effective from November 23, 2020, to November 30, 2024, and is subject to cancellation at any time upon notice by the Administrator or an authorized representative.

BY DIRECTION OF THE ADMINISTRATOR

EVERETTE C ROCHON JR

Digitally signed by EVERETTE C ROCHON JR
Date: 2020.11.23 16:37:46 -05'00'

General Aviation and Commercial Division, AFS–800

SPECIAL PROVISIONS ISSUED TO

Keith Miao

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 (VLOS) 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).

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 is valid in class G airspace only and may not be combined with any other waiver(s), authorizations(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;

[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.

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;

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;

Visual Line of Sight Operations Special Provisions The remote PIC may conduct sUAS operations without the ability to see the unmanned aircraft throughout the entire flight, provided:

OPERATIONAL PROVISIONS

8. All operations under this Waiver must use one or more VO;

9. 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;

10. At all times, at least one person who is part 107 certificated airman must maintain VLOS of sUA in order to (1) know the sUA's location, (2) determine the sUA's attitude, altitude, and direction of flight, (3) observe the airspace for other air traffic or hazards, and (4) determine that the sUA does not endanger the life or property of another. The part 107 certificated airman who is acting as a VO and responsible for maintaining VLOS of the sUA during operations must maintain effective communication with the remote PIC who is manipulating the flight controls of the sUA, and coordinate with the remote PIC to avoid all potential collision hazards and maintain awareness of the position of the sUA throughout the entire operation;

11. All persons participating in the sUAS operations conducted under this waiver must be physically located within the United States;

12. Individuals directly participating in the operation of the sUAS must be easily identifiable visually (e.g., apparel, safety vests);

13. The Responsible Person must ensure all operations conducted under this Waiver follow the procedures outlined in the 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;

14. The operations manual 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 this 14 CFR § 107.9;

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 a copy of the 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;

17. The Responsible Person listed on this Waiver 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;

18. 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, and
    h. Procedures for operating under this Waiver;

19. 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 provisions of part 107 not waived;

20. Operations subject to this waiver must cease 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. sUA control link is lost,
    e. A non-participating aircraft enters the designated flight operating area,
    f. GPS signal is lost, or
    g. sUA GPS location information is degraded;

21. No sUA flight that occurs under this waiver may carry the property of another for compensation or hire;

22. The Responsible Person must establish and maintain a Safety Management System (SMS) appropriate for the size, scope, and complexity of the waivered operation. Guidance on establishing and maintaining an SMS is available in FAA Advisory Circular 120-92B (or current revision). This program must be made available upon request by the Administrator;

23. The Responsible Person shall keep at its principal business office or at other places approved by the Administrator, and email the Administrator at 9-afs-820-Part107Reports@faa.gov monthly, the information listed below. The Responsible Person must retain all such records for a period of 90 days after the expiration date of the Waiver.
    a. For each sUAS flight operation conducted under the terms of this waiver:
        i. Date and location of operation,
        ii. Registration number of the sUA,
        iii. Make and model of the sUA,
        iv. Name and certificate number of the remote PIC,
        v. Name and location of the VO for the sUAS operation,
        vi. Name of the person who acted as a VO for the sUAS operation,
        vii. Names of any persons who acted as an additional VO(s), and
        viii. Duration of the sUA operation;

    b. For each sUAS flight conducted under this Waiver that includes any equipment degradation, malfunction, or failure, the Responsible Person must make a record of the degradation, malfunction, or failure by recording the date, time, and a description of the degradation, malfunction or failure. sUAS equipment degradations, malfunctions, or failures include, but are not limited to, the following:
        i. Onboard flight control system,
        ii. Any portion of the navigation system to include GPS functionality,
        iii. Power plant malfunction or failure,
        iv. Battery malfunction or failure,
        v. Electrical power system malfunction,
        vi. Control station malfunction or failure, and
        vii. Loss of control link within the sUAS;

TECHNICAL PROVISIONS

24. Operations conducted under this Waiver may only occur with the make and model sUA described in the waiver application. Proposed operations of any other manufacturer make or model of sUA will require a new waiver application or a request to amend this Waiver;

25. All sUAS operations conducted in accordance with this Waiver must adhere to all manufacturer recommendations and limitations for the sUAS;

26. The remote PIC and the on-site part 107 certificated airman who is acting as VO must have access to a real-time display of sUA altitude, sUA position, and sUA direction of flight information. This information must be available at all times to the remote PIC and part 107 certificated airman who is acting as the VO;

27. Any modification to the sUAS design is prohibited; repair and replacement of damaged components is allowed with a replacement part that is exactly the same as the original; no substitutions are allowed unless the Responsible Person submits a new waiver request describing the substitution or modification;

28. 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;

29. Any sUA 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;

30. A functional test flight may only be conducted under the standard requirements of part 107 (without waiver);

31. The sUA must be equipped with high visibility markings and lighting to increase the conspicuity of the sUA;

32. The GCS 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;

33. Launch or recovery areas must be pre-designated and monitored to keep any human being who is not directly participating in the operation out of the areas prior to, during, and immediately following flight operations;

34. 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 sUA to ensure compliance with applicable provisions of part 107, the sUA may not continue flight;

35. If communication between the VO and the remote PIC is by use of an electronic device:
    a. The device must be continuous full-duplex,
    b. The remote PIC's device must be hands-free, and
    c. There must be a reliable back-up communication method;

36. ADS-B out (1090/978 MHz) may not be transmitted from the sUAS when operating pursuant to this Waiver;

37. 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

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