



U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

June 11, 2015

Exemption No. 11797
Regulatory Docket No. FAA-2015-1053

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Dear Mr. Antonelli:

This letter is to inform you that we have granted your request for exemption. It transmits our decision, explains its basis, and gives you the conditions and limitations of the exemption, including the date it ends.

By letter dated April 7, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Leading Edge Technologies, LLC (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct precision agriculture.

See Appendix A for the petition submitted to the FAA describing the proposed operations and the regulations that the petitioner seeks an exemption.

The FAA has determined that good cause exists for not publishing a summary of the petition in the Federal Register because the requested exemption would not set a precedent, and any delay in acting on this petition would be detrimental to the petitioner.

Airworthiness Certification

The UAS proposed by the petitioner is a SenseFly eBee.

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*. In accordance with the statutory criteria provided in Section 333 of Public Law 112-95 in reference to 49 U.S.C. § 44704, and in

consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that the requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*, and any associated noise certification and testing requirements of part 36, is not necessary.

The Basis for Our Decision

You have requested to use a UAS for aerial data collection¹. The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grants of Exemption Nos. 11062 to Astraeus Aerial (*see* Docket No. FAA–2014–0352), 11109 to Clayco, Inc. (*see* Docket No. FAA–2014–0507), 11112 to VDOS Global, LLC (*see* Docket No. FAA–2014–0382), and 11213 to Aeryon Labs, Inc. (*see* Docket No. FAA–2014–0642), the FAA found that the enhanced safety achieved using an unmanned aircraft (UA) with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

Having reviewed your reasons for requesting an exemption, I find that—

- They are similar in all material respects to relief previously requested in Grant of Exemption Nos. 11062, 11109, 11112, and 11213;
- The reasons stated by the FAA for granting Exemption Nos. 11062, 11109, 11112, and 11213 also apply to the situation you present; and
- A grant of exemption is in the public interest.

Our Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701, delegated to me by the Administrator, Leading Edge Technologies, LLC is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

¹ Aerial data collection includes any remote sensing and measuring by an instrument(s) aboard the UA. Examples include imagery (photography, video, infrared, etc.), electronic measurement (precision surveying, RF analysis, etc.), chemical measurement (particulate measurement, etc.), or any other gathering of data by instruments aboard the UA.

Conditions and Limitations

In this grant of exemption, Leading Edge Technologies, LLC is hereafter referred to as the operator.

Failure to comply with any of the conditions and limitations of this grant of exemption will be grounds for the immediate suspension or rescission of this exemption.

1. Operations authorized by this grant of exemption are limited to the SenseFly eBee when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.
2. Operations for the purpose of closed-set motion picture and television filming are not permitted.
3. The UA may not be operated at a speed exceeding 87 knots (100 miles per hour). The exemption holder may use either groundspeed or calibrated airspeed to determine compliance with the 87 knot speed restriction. In no case will the UA be operated at airspeeds greater than the maximum UA operating airspeed recommended by the aircraft manufacturer.
4. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL). Altitude must be reported in feet AGL.
5. The UA must be operated within visual line of sight (VLOS) of the PIC at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license.
6. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the duties required of the VO.
7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The operating documents must be accessible during UAS operations and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents,

the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operating documents. The operator may update or revise its operating documents. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator or any law enforcement official upon request. The operator must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption. If the operator determines that any update or revision would affect the basis upon which the FAA granted this exemption, then the operator must petition for an amendment to its grant of exemption. The FAA's UAS Integration Office (AFS-80) may be contacted if questions arise regarding updates or revisions to the operating documents.

8. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics, e.g., replacement of a flight critical component, must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.
9. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.
10. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the UAS is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, e.g., inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.
11. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the aircraft and aircraft components.
12. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.
13. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

14. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. PIC qualification flight hours and currency must be logged in a manner consistent with 14 CFR § 61.51(b). Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building) and determining the PIC's ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption are permitted under the terms of this exemption. However, training operations may only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights, all persons not essential for flight operations are considered nonparticipants, and the PIC must operate the UA with appropriate distance from nonparticipants in accordance with 14 CFR § 91.119.
15. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.
16. The UA may not operate within 5 nautical miles of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD) or for airports not denoted with an ARP, the center of the airport symbol as denoted on the current FAA-published aeronautical chart, unless a letter of agreement with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.
17. The UA may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.
18. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the private or controlled-access property.
19. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.
20. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UA to conduct the intended operation and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater.
21. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.

22. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification (N-Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.
23. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under 14 CFR §§ 91.9 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.
24. The UA must remain clear and give way to all manned aviation operations and activities at all times.
25. The UAS may not be operated by the PIC from any moving device or vehicle.
26. All Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:
 - a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner ensuring the safety of nonparticipating persons; and
 - b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

The PIC, VO, operator trainees or essential persons are not considered nonparticipating persons under this exemption.

27. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.
28. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS-80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.nts.gov.

If this exemption permits operations for the purpose of closed-set motion picture and television filming and production, the following additional conditions and limitations apply.

29. The operator must have a motion picture and television operations manual (MPTOM) as documented in this grant of exemption.
30. At least 3 days before aerial filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local Flight Standards District Office (FSDO) with jurisdiction over the area of proposed filming. The 3-day notification may be waived with the concurrence of the FSDO. The plan of activities must include at least the following:
 - a. Dates and times for all flights;
 - b. Name and phone number of the operator for the UAS aerial filming conducted under this grant of exemption;
 - c. Name and phone number of the person responsible for the on-scene operation of the UAS;
 - d. Make, model, and serial or N-Number of UAS to be used;
 - e. Name and certificate number of UAS PICs involved in the aerial filming;
 - f. A statement that the operator has obtained permission from property owners and/or local officials to conduct the filming production event; the list of those who gave permission must be made available to the inspector upon request;
 - g. Signature of exemption holder or representative; and
 - h. A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which filming will be conducted and the altitudes essential to accomplish the operation.
31. Flight operations may be conducted closer than 500 feet from participating persons consenting to be involved and necessary for the filming production, as specified in the exemption holder's MPTOM.

Unless otherwise specified in this grant of exemption, the UAS, the UAS PIC, and the UAS operations must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 61, and 91.

This exemption terminates on June 30, 2017, unless sooner superseded or rescinded.

Sincerely,

/s/

John S. Duncan

Director, Flight Standards Service

Enclosures

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U.S. Department of Transportation
Docket Management System
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April 7, 2015

Re: Request for Exemption under Section 333 of the FAA Modernization and Reform Act of 2012 and Part 11 of the Federal Aviation Regulations from Certain Provisions of 14 C.F.R.

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the Reform Act) and 14 C.F.R. Part 11, Antonelli Law files this petition for exemption on behalf of Leading Edge Technologies, LLC (“LET”), an operator of Small Unmanned Aircraft (“UA”) used for precision agriculture. Specifically, applicant seeks an exemption from the Federal Aviation Regulations (“FARs”) listed in Appendices A and B to allow commercial operation of its UA, so long as such operations are conducted within and under the conditions outlined herein or as may be established by the FAA in a grant of this petition.

Approval of the exemption for petitioner will allow commercial operation of the senseFly eBee, for precision agriculture in Class G airspace nationwide, or as otherwise prescribed in an Air Traffic Organization (“ATO”) issued COA. The contemplated applications involve precision aerial surveys of agricultural areas (including but not limited to farm fields), using a variety of sensors and technologies (including but not limited to LIDAR, infrared photography, photogrammetry and high-resolution imagery) to collect high quality, actionable data for use by farmers, agronomists, crop consultants, and other agriculture industry professionals. The UA operations contemplated by this petition are in the public interest because they clearly satisfy the “Four D’s” of exemplary uses of UAs: to replace work that is dangerous, difficult, dull, or dirty, and at the same time provide an equivalent or greater level of safety than alternative manned aircraft operations. The UA covered by this petition is a small battery-powered craft, weighing no more than 1.8 lbs. (0.8 kg.), inclusive of battery and payload. Operation of the UA under the strict conditions proposed below will provide an equivalent level of safety, as Congress intended, while still allowing commercial operations. Operations using this UA are far safer than conventional operations conducted with helicopters and fixed-wing aircraft that weigh thousands of pounds, carry highly flammable fuel, and operate in close proximity to the ground, trees, infrastructure, and people.

Congress directed the FAA to consider seven factors in deciding whether to approve

Section 333 exemption petitions - size, weight, speed, operational capability, proximity to airports, proximity to populated areas, and operation within visual line of sight. In this case, each factor supports the exemption request. In particular, the UA is small, and will operate at slow speeds and close to the ground. It will be able to more safely and efficiently perform precision agriculture operations. The substantial increase of safety and decrease of risk to human life and to property weighs heavily in favor of granting the exemption.

Pursuant to 14 C.F.R. §11.35, petitioner requests confidential treatment for certain information provided with this request for exemption. Specifically, petitioner is submitting proprietary documents, its operating procedures, the senseFly eBee User Manual, the senseFly eBee Justification of Airworthiness and Safety Assessment, the senseFly eBee Training Documentation, and the senseFly eBee Maintenance Procedures under separate cover as Exhibits 1-5. It requests that those exhibits not be made public because they contain trade secrets whose disclosure would harm petitioner and senseFly, which provided the documents on the condition that they not be released publicly. They contain valuable commercial data that is not publicly available and are protected from release under the Freedom of Information Act, 5 U.S.C. §552(b)(4).

For your ease in reviewing this petition, please refer to the table of contents which begins on page 3. If we can provide any additional information to assist your understanding or review of this document, please do not hesitate to contact us at 312-201-8310 or via email at Jeffrey@Antonelli-Law.com.

Thank you,


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Exhibit List

Exhibit 1: senseFly eBee User ManualSubmitted confidentially to the FAA

Exhibit 2: senseFly eBee Justification of Airworthiness and Safety Assessment
.....Submitted confidentially to the FAA

Exhibit 3: senseFly eBee Training DocumentationSubmitted confidentially to the FAA

Exhibit 4: senseFly eBee Maintenance ProceduresSubmitted confidentially to the FAA

Exhibit 5: Leading Edge Technologies LLC Operating Procedures
.....Submitted confidentially to the FAA

Exhibit 6: eBee Technical SpecsSubmitted confidentially to the FAA

Exhibit 7: senseFly eBee.....Submitted confidentially to the FAA

Exhibit 8: senseFly eMotionSubmitted confidentially to the FAA

Exhibit 9: senseFly Postflight Terra 3DSubmitted confidentially to the FAA

Exhibits 1-9 have been submitted confidentially and are not available to the public.

I. Publishable Summary

Pursuant to 14 C.F.R. § 11, the following summary is provided for publication in the Federal Register, should it be determined that publication is needed:

Petitioner seeks an exemption from the following rules:

14 C.F.R. 21(h); 14 C.F.R. 43.7; 14 C.F.R. 43.11; 14 C.F.R. 45.11; 14 C.F.R. 45.27; 14 C.F.R. 45.29; 14 C.F.R. 91.7(a); 14 C.F.R. 91.9(b)(2); 14 C.F.R. 91.9(c); 14 C.F.R. 91.103(b)(2); 14 C.F.R. 91.105; 14 C.F.R. 91.109; 14 C.F.R. 91.113(b); 14 C.F.R. 91.119(c); 14 C.F.R. 91.121; 14 C.F.R. 91.151(a); 14 C.F.R. 91.203(a) and (b); 14 C.F.R. 215; 14 C.F.R. 91.403; 14 C.F.R. 91.405(a); 14 C.F.R. 91.407(a)(1); 14 C.F.R. 409(a)(1) and (a)(2); and 14 C.F.R. 91.417(a) and (b) to operate commercially a small unmanned aircraft system (UA) (1.52lbs or less).

Approval of the exemption for petitioner will allow commercial operation of the senseFly eBee for precision agriculture in Class G airspace nationwide, or as otherwise prescribed in an ATO issued COA. The requested exemption should be granted because operation of small UA, weighing approximately 1.52 lbs. (0.69 kg.), inclusive of battery and payload, conducted in the strict conditions outlined below, will provide an equivalent level of safety, while still allowing commercial operations. The lightweight aircraft covered by the exemption are far safer than conventional operations conducted with helicopters and fixed-wing aircraft weighing thousands of pounds and carrying highly flammable fuel, and operating in close proximity to the ground and people. The seven factors Congress directed the FAA to consider when approving Section 333 exemption petitions - size, weight, speed, operational capability, proximity to airports, proximity to populated areas, and operation within visual line of sight – each support the request. In particular, the aircraft are small, and will operate at slow speeds, and close to the ground in order to more safely and efficiently conduct operations that would otherwise be significantly more expensive or time consuming. The substantial increase of safety and decrease of risk to human life, coupled with the low risk use of UAs to conduct these operations, weigh heavily in favor of granting the exemption.

II. Petitioner's Contact Information

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III. Proposed Operations

A. The UA

The requested exemption will permit petitioner to operate the eBee, with a maximum weight of 1.52 lbs. (0.69 kg.), inclusive of batteries and technical payload. This rotorcraft operates at a speed of no more than 49 knots and has the capability to hover and move in the vertical and horizontal planes simultaneously.

The UA will have the following specifications or equivalent:

Airframe: senseFly eBee

Wingspan: 96 cm. (3.2 ft.)

Control System: internal to the eBee which includes the Main Controller (MC), Internal Measurement Unit (IMU) with a built-in internal sensor, barometric altimeter (which measures attitude and altitude), compass, GPS, and radio receiver (Rx).

Transmitter (Tx): senseFly system with 2.4 GHz

Receiver (Rx): internal to eBee

Motor: electric brushless motor with nominal static thrust of 6.2 N

Data Link: 2.4 GHz USB ground modem

OSD: senseFly eMotion 2 software, which allows live telemetry to be displayed to the visual observer, including the battery level and altitude

Batteries: Lithium Polymer batteries with capacity of 2150 mah

Please refer to Exhibits 1-2 and 6-9 for further information about the airframe, control system and transmitters. The petition and the supporting documentation in those exhibits and Exhibits 3-5 are hereinafter referred to as the “operating documents.”

The specific conditions of the proposed exemption that relate to the characteristics of the UA are numbers 1, 5, and 19 in Section V below. Each has been adopted or imposed by the FAA in numerous previous grants of Section 333 exemption petitions. In addition, the FAA has previously approved flight of the eBee in Exemption No. 11170.

B. The Crew

The crew will consist of a pilot in command (PIC) and a visual observer (VO). The PIC will have, at minimum, a private pilot’s license and a third class medical certificate.

The PIC and VO will have been trained in operation of UA generally and received up-to-date information on the UA to be operated pursuant to this grant. The PIC will have completed, at a minimum, 16 hours of UA flight training with this specific UA prior to operations, and will be required to participate in annual training thereafter.

The specific conditions of the proposed exemption that relate to the training and characteristics of the crew are numbers 3 and 6-10 in Section V below. Each has been adopted or imposed by the FAA in numerous previous grants of Section 333 exemption petitions.

C. Flight Conditions

The UA will be used for precision agriculture. It will be flown in Class G airspace nationwide under 500 feet above ground level (“AGL”), unless otherwise prescribed by an ATO issued COA, and under controlled conditions over rural agricultural property. Petitioner will work with the local FSDO when planning operations. Petitioner will only operate its UA in visual meteorological conditions (VMC). The UA will at all times be no less than 500 feet below and no less than 2,000 feet horizontally from a cloud, and petitioner will not conduct operations unless visibility is at least 3 statute miles from the PIC. The flight crew will always make a safety assessment of the risk of every operation, and will only operate when it is determined that no hazards are present.

The 500 feet AGL limitation is in line with the Small UAS Notice of Proposed Rulemaking (NPRM). Operation and Certification of Small Unmanned Aircraft, 80 Fed. Reg. 9543 at 9547 (proposed Feb. 23, 2015 (to be codified at 14 C.F.R. Parts 21, 43, 45, et al.)). The FAA determined that this higher ceiling was a safe limit because:

“most manned aircraft operations take place above 500 feet. Specifically, most manned aircraft operations conducted over uncongested areas must be flown at an altitude above 500 feet AGL, while most manned aircraft operations conducted over congested areas must be flown at an even higher altitude. Thus, a 500-foot altitude ceiling for small UAS operations would create a buffer between a small unmanned aircraft and most manned aircraft flying in the NAS... [T]here is significantly less air traffic at or below 500 feet than there is above 500 feet altitude. As a result of this difference in air-traffic density, the FAA has determined that small UAS operations would not pose a significant risk to manned aircraft operations taking place below 500 feet altitude if proper precautions are taken by the small UAS operator” *Id.* at 9562-63.

Should the FAA not allow this request, petitioner will limit flights to 400 feet AGL.

Please refer to Exhibit 5, Section 1.A for additional information regarding flight conditions.

The specific conditions of the proposed exemption that relate to the flight conditions in which the UA will be operated are numbers 2, 4, 16, 25, and 27-29 in Section V below. Each has been adopted or imposed by the FAA in numerous previous grants of Section 333 exemption petitions.

D. Flight Operations

Every UA flight will use at minimum a two person flight crew: a PIC and a VO. The standard operational procedures that they will follow are set out in the operating documents, specifically Exhibits 1 and 5. Please refer to the following sections for information pertaining to operations:

Exhibit 1:

- Section 1.3: Creating a new flight plan
- Section 1.4: The mission phase of a flight
- Section 1.5: Simulating your flight

- Section 1.6: Getting ready for a mission
- Section 2: Executing a flight

Exhibit 5:

- Section 3: Operating Procedures
- Section 4: Flights
- Section 5: Inspections
- Section 6: Maintenance
- Section 7: Logbooks

The specific conditions of the proposed exemption that relate to flight operations are numbers 2, 3-4, 11-18, 20-24, 26-27, and 31-36 in Section V below. Each has been accepted or imposed by the FAA in numerous previous grants of Section 333 exemption petitions.

IV. Aircraft and Equivalent Level of Safety

Petitioner proposes that the exemption apply to UAs that have the characteristics and that operate with the limitations proposed herein. These limitations provide for a level of safety at least equivalent to or higher than manned aircraft operations under the current regulatory structure. Section V below identifies the limitations and conditions to which petitioner agrees to be bound when conducting commercial operations under a grant of this petition. Appendix A contains a matrix connecting: (i) the specific proposed condition with (ii) the FAR provision for which it provides an equivalent level of safety and (iii) one or more recent Section 333 exemption grants in which the FAA recognized this equivalent level of safety.

Approval of the commercial operations outlined in this petition presents no national security issue. The PIC will possess, at minimum, a private pilot's certificate and third class medical, so he or she will have been subject to security screenings by the Department of Homeland Security.

V. Proposed Conditions of the Exemption

1. The UA will weigh no more than 1.8 lbs. (0.8 kg.), inclusive of battery and technical payload.
2. UA operations under this exemption will be limited to conducting operations for the purpose of precision agriculture in Class G airspace nationwide.
3. Flights will be operated within line of sight of a pilot and visual observer.
4. Flights will be operated at an altitude of no more than 500 feet AGL, as indicated by the procedures specified in the operating documents. All altitudes reported to ATC must be in feet AGL.
5. The UA will not be flown at an indicated airspeed exceeding 49 knots.
6. Minimum flight crew for each operation will consist of the UA pilot in command (PIC) and a visual observer (VO).
7. The PIC will have, at minimum, a private pilot license and a third class medical certificate.

8. The petitioner will not permit any PIC to operate unless the PIC meets its qualification criteria and demonstrates the ability to safely operate the UA in a manner consistent with how the UA will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. PIC qualification flight hours and currency will be logged in a manner consistent with 14 CFR §61.51(b). A record of the PIC training will be documented and made available upon request by the Administrator. Training operations will only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights, all persons not essential for flight operations will be considered nonparticipants, and the PIC will operate the UA with appropriate distance from nonparticipants in accordance with 14 CFR § 91.119.
9. The VO will not perform any other duties beyond assisting the PIC with seeing and avoiding other air traffic and other ground based obstacles/obstructions, and will not be permitted to operate the camera or other instruments.
10. The PIC will be designated before the flight and will not be allowed to transfer his or her designation for the duration of the flight. The PIC will ensure that the VO can perform the functions prescribed in these conditions and the operating documents.
11. A briefing will be conducted in regard to the planned UA operations prior to each day's activities. It will be mandatory that all personnel who will be performing duties in connection with the operations be present for this briefing.
12. Prior to each flight, the PIC will inspect the UA, including the Ground Control Station, to ensure it is in a condition for safe flight. If the inspection reveals a condition that affects the safe operation of the UA, the PIC will not operate the UA until the necessary maintenance has been performed and the UA is found to be in a condition for safe flight. All maintenance and alterations will be properly documented in the aircraft records.
13. Petitioner will conduct a functional flight test on any UA that has undergone maintenance or alterations that affect the UA operation or flight characteristics, e.g. replacement of a flight critical component. The PIC who conducts the functional test flight will make an entry in the aircraft records.
14. The petitioner will carry out its maintenance, inspections, and record keeping requirements, in accordance with the UA manufacturer's aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements set forth in the operating documents. Maintenance, inspection, alterations, and status of replacement/overhaul component parts will be noted in the aircraft records, including total time in service, description of work accomplished, and the signature of the authorized person returning the UA to service. The authorized person will make an entry in the aircraft record of the corrective action taken against discrepancies discovered between inspections.
15. The UA will be operated within visual line of sight (VLOS) of the PIC and VO at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses. PIC and VO will at all times be able to communicate verbally. They will not be permitted to use electronic messaging or texting to communicate during flight operations.
16. The PIC will not begin a flight unless (considering wind and forecast weather conditions) there

is enough power to fly at normal cruising speed to the intended landing point and prepare to land the UA with 25% battery power remaining.

17. Actual total flight time for each operational flight will result in no less than a 25% battery reserve.
18. The UA will have the capability to abort a flight in case of unexpected obstacles or emergencies.
19. The UA will be programmed so that if it loses communications or loses its GPS signal, it will return to a pre-determined location within the planned operating area and land or be recovered in accordance with the operating documents
20. If the UA and its radio control link disconnect during flight, the system's failsafe protection will be triggered and the multirotor will return to home and land automatically, rather than flying off uncontrollably or landing at an unknown location.
21. The operating documents required under 14 CFR §§ 91.9 and 91.203 will be maintained and available to the PIC at the Ground Control Station of the UA any time the UA is operating. These documents will be made available to the Administrator or any law enforcement official upon request. If a discrepancy exists between the conditions and limitations in the exemption grant and the procedures outlined in the operating documents, the grant conditions and limitations will take precedence and will be followed. Otherwise, the petitioner will follow the procedures outlined in its operating documents. If it updates or revises its operating documents, it will present updated and revised documents to the Administrator upon request. If the petitioner determines that any update or revision would affect the basis upon which the FAA granted the exemption, then the Petitioner will petition for an amendment to the grant of exemption.
22. Petitioner will obtain written and/or oral permission from the landowners/authorized agents of the landowners of the land over which flights will be conducted.
23. Petitioner will obtain all required permissions and permits from territorial, state, county or city jurisdictions, including local law enforcement, fire, or other appropriate governmental agencies.
24. UA operations will not be conducted during night, as defined in 14 CFR § 1.1. All operations will be conducted under visual meteorological conditions (VMC). Flights will not be conducted under special visual flight rules (SVFR).
25. The petitioner will obtain an Air Traffic Organization (ATO) issued Certificate of Waiver or Authorization (COA) prior to conducting any operations under the grant of exemption. Petitioner will request a Notice to Airman (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to the operation. All operations will be conducted in accordance with airspace requirements in the ATO issued COA, including class of airspace, altitude level and potential transponder requirements.
26. The UA will not be operated within 5 nautical miles of an airport reference point as denoted on a current FAA-published aeronautical chart unless a letter of agreement with that airport's

management has been obtained, and the operation is conducted in accordance with a NOTAM as required by the operator's COA. Any letter of agreement with the airport management will be made available to the Administrator upon request.

27. The UA will not be operated less than 500 feet below, or less than 2,000 feet horizontally from, a cloud or when visibility is less than 3 statute miles from the PIC.
28. All operations shall be conducted in Class G airspace or as otherwise prescribed in an ATO issued COA.
29. All aircraft operated in accordance with this exemption will be identified by serial number, registered in accordance with 14 CFR part 47, and have identification (N-Number) markings in accordance with 14 CFR part 45, Subpart C. Markings will be as large as practicable.
30. Before conducting operations, petitioner will ensure that the radio frequency spectrum used for operation and control of the UA complies with the Federal Communications Commission (FCC) or other appropriate government oversight agency requirements.
31. The UA will remain clear and yield the right of way to all manned aviation operations and activities at all times.
32. The UA will not be operated by the PIC from any moving device or vehicle.
33. The UA will not be operated over congested or densely populated areas.
34. Petitioner will conduct all flight operations at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless one of the following three conditions is met:
 - a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The petitioner will ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, the PIC will ensure that flight operations cease immediately.
 - b. The aircraft is operated near vessels, vehicles or structures where the owner/controller of such vessels, vehicles or structures has granted permission and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.
 - c. Operations nearer to the PIC, VO, operator trainees or essential persons do not present an undue hazard to those persons per § 91.119(a).
35. Petitioner will report any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA to the FAA's UA Integration Office (AFS-80) within 24 hours. Petitioner will report accidents to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.nts.gov.

VI. Privacy

There is little concern that the proposed flights will cause invasions of privacy because all flights will occur over rural, private property that petitioner has been contracted to fly over. When the UA is being flown, the onboard cameras will be focused on ground area, not on nonparticipating individuals who may be present during operations. Once the data has been collected, the file will be trimmed so that it only contains images of the field being monitored. The data will be distributed only to the client.

VII. Public Interest and Safety

The planned UA use will increase ground safety in the precision agriculture industry. The enhanced safety and reduced environmental impact achieved using a UA with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UA operation enabled by this exemption is in the public interest.

Satisfaction of the criteria provided in Section 333 of the Reform Act of 2012 – size, weight, speed, operating capabilities, proximity to airports and populated areas and operation within visual line of sight and national security – provide more than adequate justification for the grant of the requested exemption allowing commercial operation of applicant's UA for precision agriculture operations, pursuant to petitioner's rules of operation.

Use of UA technology to assist in precision agriculture is a benefit not only to farmers, but to the public as a whole, and to the environment. Farmers will have greater crop analytical tools at their disposal for managing crops, leading to decreased use of resources. This will result in both reduction of cost and increase in quality – benefits that will be passed on to the public. Additionally, using less water and chemicals during commercial farming operations will reduce the impact that the operation has on the environment.

As Jeff Vanderwerff testified on behalf of the American Farm Bureau Federation before members of the Senate Committee on Commerce, Science, & Transportation on March 24, 2015:

[The benefit of UA comes from] their ability to provide detailed scouting information on weed emergence, insect infestations and potential nutrient shortages. This valuable information allows the farmer to catch these threats before they develop into significant and catastrophic problems. By addressing threats quickly, the farmer has a greater likelihood of being able to respond appropriately so as to optimize yields.

The imagery from UAS also allows the farmer to spot-treat sections of the fields as opposed to watering or spraying the entire field. The quicker a farmer can discover a potential threat, the quicker the farmer can address the issue. Images from UAS allow the farmer to identify the specific location where a specific treatment – be it fertilizer, water, pesticides, or herbicides is necessary; in doing so, the farmer can eliminate the need to use these applications more broadly across the entire field. ***By spot-treating threats to the crop, the farmer not only lowers the cost of treatment but also has the potential of lowering the environmental impact by minimizing***

application.” (emphasis added)¹

The FAA has previously determined that the use of the eBee for precision agriculture will provide an equivalent or greater level of safety than manned flight in Exemption No. 11170.

Additionally, the FAA has previously approved a variety of other UAs for commercial precision farming and agriculture applications in Exemption Nos.:

- 11110 (precision aerial surveys);
- 11136 (photogrammetry and crop scouting in order to perform precision agriculture);
- 11166 (agriculture analysis and high resolution aerial imagery);
- 11167 (high-resolution aerial imagery in support of, biomass analysis and estimation, yield monitoring, leaf area indexing and reporting of geographical data and overall crop health to a domestic agricultural seed company);
- 11177 (commercial precision agriculture surveys);
- 11192 (aerial photography and 3D mapping for the agriculture industry);
- 11193 (precision photogrammetry and crop scouting for precision agriculture);
- 11195 (aerial photography for agriculture);
- 11222 (collect high quality, actionable data for use by agronomists, crop consultants, and forestry professionals);
- 11223 (precision agriculture survey and inspection operations);
- 11226 (precision aerial surveys);
- 11228 (aerial acquisition and research in support of the agriculture industry); and
- 11229 ((aerial acquisition and research in support of the agriculture industry).

¹ *Unmanned Aircraft Systems: Key Considerations Regarding Safety, Innovation, Economic Impact, and Privacy Before the S. Comm. On Commerce, Science, & Transportation*, 114th Cong. 1 (2015) (written statement of Jeff Vanderwerff on behalf of the American Farm Bureau Federation).

VIII. Regulations from Which Exemption is Requested

Each of the Regulations LET wishes an exemption from has previously been addressed by the FAA. Appendix A lists the FARs the FAA has specifically spoken on.

A. Appendix A: FARs as to which LET wishes the same determination to be made as has been made previously.

FAR Provision	Applicable condition(s) in Section 5 of petition	FAA Exemption Decision
21(h)	1, 2, 3, 5, 16, 25, 28, 29, 34, 35	Nos. 11062, 11063, 11064, 11065, 11066, 11067, 11080, 11109, 11111, 11110, 11114, 11136, 11138, 11150, 11153, 11156, 11157, 11166, 11167, 11170, 11171, 11172, 11174, 11176, 11177, 11178, 11184, 11185, 11188, 11189, 11191, 11192, 11193, 11195
43.7	13, 14	No. 11208
43.11	12	No. 11208
45.11	30	No. 11208
45.27	39	No. 11188
45.29	30	Nos. 11136, 11157, 11170, 11185, 11193
91.7(a)	12	Nos. 11062, 11063, 11064, 11065, 11066, 11067, 11080, 11109, 11110, 11136, 11138, 11150, 11153, 11156, 11157, 11158, 11160, 11161, 11166, 11167, 11170, 11171, 11172, 11174, 11177, 11178, 11184, 11185, 11188, 11189, 11191, 11192, 11193, 11195, 11204
91.9(b)(2)	22	Nos. 11062, 11063, 11064, 11065, 11066, 11067, 11080, 11109, 11110, 11111, 11112, 11114, 11136, 11138, 11150, 11153, 11156, 11157, 11062, 11063, 11064, 11065, 11066, 11067, 11080, 11109, 11110, 11111, 11112, 11114, 11136, 11138, 11150, 11153, 11156, 11157, 11174, 11177, 11178, 11184, 11185, 11189, 11192, 11193, 11195
91.9(c)	30	Nos. 11136, 11170, 11171, 11174, 11185
91.103(b)(2)	3, 9, 16, 17, 18, 19, 20, 28	No. 11062, 11063, 11064, 11065, 11066, 11067, 11080, 11109, 11138, 11150, 11153, 11156, 11158, 11160, 11161, 11166, 11167, 11171, 11172, 11176, 11177, 11178, 11184, 11185, 11188, 11188, 11189, 11191, 11192, 11193, 11195, 11204
91.105	6	No. 11185
91.109	7, 8	Nos. 11062, 11063, 11064, 11065, 11066, 11067, 11080, 11109, 11110, 11112, 11136, 11138, 11150, 11153, 11156, 11157, 11166, 11167, 11170, 11171, 11174, 11177, 11184, 11185, 11189, 11191, 11192, 11193, 11194, 11195, 11206, 11208

91.113(b)	3, 32	No. 11238
91.119(c)	4, 34	Nos. 11162, 11163, 11164, 11165, 11166, 111080, 111109, 11110, 11111, 11112, 11114, 11136, 11138, 11150, 11153, 11156, 11160 11161, 11166, 11167, 11170, 11171, 11172, 11174, 11176, 11178, 11185, 11188, 11189, 11190, 11193
91.121	4	Nos. 11162, 11163, 11164, 11165, 11166, 111080, 111109, 11136, 11138, 11150, 11153, 11156, 11160 11161, 11166, 11167, 11170, 11171, 11174, 11176, 11178, 11185, 11188, 11189, 11190, 11193
91.151(a)	17, 18	Nos. 11110, 11153, 11156, 11161; 111109, 11110, 11112, 11136, 11138, 11150, 11153, 11156, 11160 11161, 11166, 11167, 11170, 11171, 11172, 11174, 11176, 11178, 11185, 11188, 11189, 11190, 11193
91.203 (a) and (b)	22	Nos. 11062, 11063, 11064, 11065, 11066, 11067, 11080, 11109, 11110, 11111, 11112, 11114, 11136, 11138, 11150, 11153, 11156, 11157, 11170, 11171, 11172, 11174, 11176, 11177, 11178, 11184, 11185, 11188, 11188, 11189, 11191, 11192, 11193, 11195
91.215	26, 27	No. 11185, 11195
91.403	12, 13, 14	No. 11185
91.405(a)	12, 13, 14	Nos. 11062, 11063, 11064, 11065, 11066, 11067, 11080, 11109, 11110, 11111, 11112, 11114, 11136, 11138, 11150, 11153, 11156, 11157, 11158, 11160, 11161, 11166, 11167, 11170, 11171, 11172, 11174, 11176, 11177, 11178, 11184, 11185, 11188, 11188, 11189, 11191, 11192, 11193, 11195, 11204
91.407(a)(1)	14	Nos. 11062, 11063, 11064, 11065, 11066, 11067, 11080, 11109, 11110, 11111, 11112, 11114, 11136, 11138, 11150, 11153, 11156, 11157, 11158, 11160, 11161, 11166, 11167, 11170, 11171, 11172, 11174, 11176, 11177, 11178, 11184, 11185, 11188, 11188, 11189, 11191, 11192, 11193, 11195, 11204
91.409(a)(1)	12, 13, 14	Nos. 11062, 11063, 11064, 11065, 11066, 11067, 11080, 11109, 11110, 11111, 11112, 11114, 11136, 11138, 11150, 11153, 11156, 11157, 11158, 11160, 11161, 11166, 11167, 11170, 11171, 11172, 11174, 11176, 11177, 11178, 11184, 11185, 11188, 11188, 11189, 11191, 11192, 11193, 11195, 11204

91.409(a)(2)	12, 13, 14	Nos. 11062, 11063, 11064, 11065, 11066, 11067, 11080, 11109, 11110, 11111, 11112, 11114, 11136, 11138, 11150, 11153, 11156, 11157, 11158, 11160, 11161, 11166, 11167, 11170, 11171, 11172, 11174, 11176, 11177, 11178, 11184, 11185, 11188, 11188, 11189, 11191, 11192, 11193, 11195, 11204
91.417(a)	12, 13, 14	Nos. 11062, 11063, 11064, 11065, 11066, 11067, 11080, 11109, 11110, 11111, 11112, 11114, 11136, 11138, 11150, 11153, 11156, 11157, 11158, 11160, 11161, 11166, 11167, 11170, 11171, 11172, 11174, 11176, 11177, 11178, 11184, 11185, 11188, 11188, 11189, 11191, 11192, 11193, 11195, 11204
91.417(b)	12, 13, 14	Nos. 11062, 11063, 11064, 11065, 11066, 11067, 11080, 11109, 11110, 11111, 11112, 11114, 11136, 11138, 11150, 11153, 11156, 11157, 11158, 11160, 11161, 11166, 11167, 11170, 11171, 11172, 11174, 11176, 11177, 11178, 11184, 11185, 11188, 11188, 11189, 11191, 11192, 11193, 11195, 11204