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

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

May 21, 2015

Exemption No. 11646
Regulatory Docket No. FAA–2015–0700

Mr. Cameron R. Cloar
Associate
Counsel for BioSensing Systems, LLC
One Embarcadero Center, 18th Floor
San Francisco, CA 94111

Dear Mr. Cloar:

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 March 16, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of BioSensing Systems, LLC (hereinafter petitioner or operator) for an exemption. The exemption would allow the petitioner to operate an unmanned aircraft system (UAS) to conduct aerial imagery, inspection, and data collection services.

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 collection. 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, BioSensing Systems, 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.

Conditions and Limitations

In this grant of exemption, BioSensing Systems, 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 5 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.ntsb.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 May 31, 2017, unless sooner superseded or rescinded.

Sincerely,

/s/
John S. Duncan
Director, Flight Standards Service

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March 16, 2015

U.S. Department of Transportation
Docket Management System
1200 New Jersey Ave, SE
Washington, DC 20590

RE: Exemption Request Under Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the "Reform Act" or "Section 333"), Subsection (f) of 49 U.S.C. § 44701, and 14 C.F.R. Part 11, BioSensing Systems, LLC ("BioSensing Systems") seeks an exemption from the Federal Aviation Regulations ("FARs") listed below and discussed in **Appendix A** to allow it to operate the Sensefly eBee small Unmanned Aircraft System ("eBee"). BioSensing Systems is an agricultural and technology company that plans to utilize new data collection technology to assist agricultural and farming companies in harvesting applications. BioSensing Systems plans to use the eBee for aerial imagery, inspection and data collection services for projects across the United States. The information collected by the eBee will help agricultural and farming companies make improved decisions on issues such as irrigation, fertilization, detection of diseases, calculate potential crop yield, and to analyze the impact of pesticides and fertilizers.

The safety and public benefits of using the eBee for commercial aerial imagery, data collection and inspection services are significant. The eBee reduces the need to operate manned aircraft in unconventional operations, provides more accurate data in a manner that is more safe, economical and efficient, and with a reduced impact on the environment. Because BioSensing Systems plans to utilize the eBee to assist farming companies make improved decisions on the cultivation of crops, the operations will also indirectly result in an increase in economic growth. [*See* FAA Exemption No. 11167, p. 14.]

Operations pursuant to the exemption will be subject to strict operating requirements and conditions to ensure at least an equivalent level of safety to currently authorized operations using manned aircraft and under conditions as may be modified by the FAA as required by

Section 333. The eBee weighs a mere 1.5 pounds and its airframe is constructed of flexible foam. The eBee is powered electrically via a small, lithium polymer battery that drives an electric pusher propeller. It operates at a cruising speed of 22 mph – 35 mph. The eBee was designed with extensive automated control features, redundant systems, and integrated fail-safes, and it will be operated under controlled conditions and at low altitudes in airspace that is limited in scope.

Though the eBee may safely be operated by one person, flight operations performed pursuant to this exemption will consist of at least two people: a pilot-in-command (the "PIC") and visual observer. The PIC is responsible for the direct and safe operation of the eBee, monitoring its status and flight dynamics while maintaining visual line of sight and keeping the flight within the manufacturer's specified limits in terms of wind, flight range, battery life, etc. The observer will be responsible for monitoring the airspace for other aircraft and hazards, advising the PIC before and during flight of all such observed risks, and monitoring the controlled operating area. Individuals acting as the PIC will complete training specific to the eBee. The PIC will be a certificated airman with private pilot privileges and limitations, and maintain a current third-class medical certificate.

Because the eBee will be used in lieu of comparatively higher risk operations now conducted with fixed wing and rotary manned aircraft, the FAA can have confidence that BioSensing Systems' operations will achieve at least an equivalent level of safety and fulfill the Secretary of Transportation's responsibilities under Section 333(c) of the Reform Act to "establish requirements for the safe operation of such aircraft systems in the national airspace system." Moreover, the FAA has already granted four 333 exemption requests for operation of the eBee model. [FAA Exemption Nos. 11136; 11167; 11170; 11193.] Accordingly, it should grant this exemption request without delay.

Applicant Information

The name of the applicant is:

BioSensing Systems, LLC

The primary contact for this application is:

Vincent Pluvinage, Ph.D.
BioSensing Systems
911-B Blanco Circle
Salinas, CA 93901
Ph: (650) 787-0919
E-mail: vincent@inventioncp.com

Exemptions Requested

BioSensing Systems respectfully requests exemptions from the following regulations:[1]

14 C.F.R. Part 21, Subpart H;
14 C.F.R. § 91.7;
14 C.F.R. § 91.9(b)(2);
14 C.F.R. § 91.113;
14 C.F.R. § 61.113(a), (b);
14 C.F.R. § 61.133(a);
14 C.F.R. § 91.119(c);
14 C.F.R. § 91.121;
14 C.F.R. § 91.151;
14 C.F.R. § 91.203;
14 C.F.R. § 91.405(a) and (b);
14 C.F.R. § 91.407(a)(1);
14 C.F.R. § 91.409(a)(1)-(2); and
14 C.F.R. § 91.417(a).

THE APPLICABLE LEGAL STANDARD UNDER SECTION 333

Grant of this exemption application for use of the eBee in precision aerial imagery, data collection and inspection operations will advance the Congressional mandate in Section 333 of the Reform Act to accelerate the introduction of UAS into the national airspace system ("NAS") if it can be accomplished safely. This law directs the Secretary of Transportation to consider whether certain UAS may operate safely in the NAS before completion of the rulemaking required under Section 332 of the Reform Act. In making this determination, the Secretary is required to determine which types of UAS do not create a hazard to users of the NAS or the public, or pose a threat to national security in light of the following:

- The UAS's size, weight, speed, and operational capability;
- Operation of the UAS in close proximity to airports and populated areas; and
- Operation of the UAS within visual line of sight of the operator.

[1] As set forth in Appendix B, BioSensing Systems will operate under similar operating conditions as those required in the other grants of exemption, in which exemptions for certain FARs was deemed by the FAA as "not necessary." Accordingly, BioSensing Systems does not request FAA exemption from 14 C.F.R. 45.23(b), 91.103, and 91.109(a). Should the FAA determine that relief from these or any other regulation is required for the operations proposed herein, BioSensing Systems will be happy to submit an amendment to this request and include justifications for those necessary additional exemptions.

Reform Act § 333(a)(1). If the Secretary determines that such vehicles "may operate safely in the national airspace system, the Secretary shall establish requirements for the safe operation of such aircraft in the national airspace system." *Id.* §333(c) (emphasis added).[2]

The Federal Aviation Act expressly grants the FAA the authority to issue exemptions. This statutory authority, by its terms, includes exempting civil aircraft, as the term is defined under §40101 of the Act, from the requirement that all civil aircraft must have a current airworthiness certificate and those regulations requiring commercial pilots to operate aircraft in commercial service:

> The Administrator may grant an exemption from a requirement of a regulation prescribed under subsection (a) or (b) of this section or any of sections 44702-44716 of this title if the Administrator finds the exemption is in the public interest.

49 U.S.C. §44701(f). *See also* 49 USC §44711(a); 49 USC §44704.

The grant of the requested exemption is in the public interest based on the clear direction in Section 333 of the Reform Act; the additional authority in the Federal Aviation Act, as amended; the strong equivalent level of safety surrounding the proposed operations; and the significant public benefit, including enhanced safety and cost savings associated with transitioning to UAS for aerial imagery, data collection and inspection services. BioSensing Systems therefore respectfully requests that the FAA grant the requested exemption without delay.

Airworthiness of the eBee

One element of the exemption application involves evidence of the airworthiness of the eBee. BioSensing Systems and SenseFly believe that the eBee has been shown to be airworthy and compliant with a significant level of safety. The four previous 333 Grants of Exemption by the FAA further highlight that operations of the eBee will not adversely affect safety when compared to similar operations conducted by aircraft that have been issued an airworthiness certificate under 14 C.F.R. Part 21, Subpart H. [Exemption Nos. 11136; 11167; 11170; 11193.] Numerous other aviation regulatory agencies of other countries have also provided their

[2] This provision places a duty on the Administrator to not only process applications for exemptions under Section 333, but for the Administrator, if he deems the conditions proposed herein require modification in order to allow approval, to supply conditions for the safe operation of the UAS. BioSensing Systems welcomes the opportunity to consult with FAA staff to address any issues or concerns that this proposal may raise that they believe may require modification.

approval for the eBee, including without limitation, Switzerland, Canada, Australia, France, Germany, United Kingdom, Norway, Sweden and Denmark.

To enhance safety, it is also important to note that the eBee is equipped with automated features which enhance safe takeoff, flight, and landing in many conditions, further details of which are provided in the eBee SenseFly User Manual, and the eBee Justification of Airworthiness and Safety Assessments.[3]

To maintain airworthiness, BioSensing Systems will follow the inspection and maintenance program designed specifically for the eBee by SenseFly. That program is enhanced by an inflight monitoring system for the eBee that monitors current position, wind speed and direction, battery charge, flight time, and altitude, including both above the takeoff location and above sea level. If onboard sensors detect a critical situation at any time (low battery, close proximity to the ground, weak data link signal, etc.) the eBee will automatically initiate a preprogrammed safety procedure. In the event of any malfunction, the eBee will undergo all maintenance required by the manufacturer and undergo flight testing before recommencing commercial operations.

Proposed Operations and Associated Conditions

BioSensing Systems intends to use the eBee that weighs significantly less than 55 pounds for the purpose of collecting aerial imagery and data, as well as aerial inspection and documentation of crops and for related use in farming and agricultural operations. Sensors mounted on the eBee will also collect information to help farming companies make improved decisions on irrigation, fertilization, disease detection, readiness to harvest and other similar issues.

All of the eBee operations will occur under tightly controlled conditions on privately owned land at the owner's request and consent, solely during daylight hours, and at altitudes well below that which would pose a risk to other aircraft. The operations will take place in areas away from people, crowds and airports. Moreover, due to the nature and purpose of the operations, BioSensing Systems anticipates that it will fly the eBee at relatively low altitudes and speeds. The risk of interference with another aircraft is therefore minimal.

Grant of this exemption to BioSensing Systems will be subject to the conditions listed in **Appendix B**, which are based upon the operating conditions required by the FAA's previous grants of exemptions. The eBee is characterized by a high degree of pre-programmed control and various built-in technical capabilities that limit the potential for operation outside of the

[3] BioSensing Systems submits the following documents, as proprietary and under confidentiality, in support of this Exemption Request: the eBee SenseFly User Manual, eBee Inspection and Maintenance Requirements, the SenseFly eBee Training Documentation, and the eBee Justification of Airworthiness and Safety Assessments. At the request of the FAA, BioSensing Systems will also be pleased to provide, under confidentiality, its General Operations Manual.

conditions set forth in **Appendix B**. It was also designed with internal functional and safety features to assist the operator in safe and reliable operation. With pre-programmed flights and manual control, operators can easily maintain separation from manned aircraft operations and avoid other hazards. In the controlled environment under the operations conditions in **Appendix B**, operations will remain within visual line-of-sight (VLOS) and below 400 feet AGL. In addition, BioSensing Systems will obtain a Certificate of Waiver or Authorization from the FAA Air Traffic Organization to address airspace requirements and provide notification by a Notice to Airman (NOTAM).

Operator Requirements

As a condition to the grant of the exemptions, BioSensing Systems will require that the PIC hold a private pilot's certificate and a valid third-class medical certificate. The PIC will have accumulated and logged a minimum number of flight cycles and hours for daytime operations, as necessary. The PIC will also be subject to the flight review requirements pursuant to the Federal Aviation Regulations ("FARs").

In addition, the PIC must complete a training program for the eBee. This training familiarizes the PIC to the operations and limitations of the eBee. Training will also include discussions on the basic fundamentals of UAS aerodynamics and technical limitations, as well as the more general topics of weather, the National Airspace System, and the regulatory framework.

BioSensing Systems does not believe that certified airmen, medical certificates, and the related operating conditions, are necessary or required to operate the eBee. However, BioSensing Systems will accept these requirements as a condition to the grant of this exemption. If, and when, the FAA finds such conditions unnecessary for operations conducted pursuant to Section 333 exemptions, BioSensing Systems respectfully reserves the right to amend its operating conditions and request exemption from the relevant FARs to operate without such conditions.

Public Interest

The use of the eBee in lieu of comparatively hazardous operations currently conducted with conventional fixed wing and rotary aircraft offers a net safety benefit and will achieve an enhanced level of safety, as mandated under Section 333(c) of the Reform Act. Approval of this application will also benefit the public interest by allowing better, safer, and more cost efficient information for BioSensing Systems and the public.

Conventional aerial imagery and inspection operations using manned aircraft involve heavy aerial aircraft that must transit from airports to the operational location, carrying significant amounts of combustible fuel, and a multi-person crew. Manned aircraft are also at risk of fuel spillage and fire in the event of an accident or incident. By contrast, use of the eBee is safe, economical and efficient. The eBee weighs a mere 1.5 pounds, is carried (not flown) to and

from the area of activity, removes the need for an airborne crew, and poses less risk to people and infrastructure on the ground, as well as other aircraft.

No national security issue is raised by the grant of the requested exemptions. Given the size, load-carrying capacity, the speed at which the eBee operates (22-35 mph), and the fact that it does not carry explosives or other dangerous materials, the use of the eBee poses no threat to national security. In fact, the threat of causing damage to property is significantly reduced with the extremely low weight of the eBee and limited operating areas. Any other security concerns are ameliorated by the fact that all individuals holding a private pilot certificate are subject to a security screening by the U.S. Department of Homeland Security.

The grant of the requested exemption is in the public interest based on the clear direction in Section 333, the Federal Aviation Act,[4] the high and equivalent level of safety of the proposed operations, and the significant public benefit, including enhanced safety and cost savings to be realized as a result of the use of the eBee for aerial imagery, data collection and inspections. It is also in-line with the previous Grants of Exemption by the FAA for the SenseFly eBee. [Grant of Exemption Nos. 11136; 11167; 11170; and, 11193.] Accordingly, BioSensing Systems respectfully requests that the FAA grant an expedited exemption.

Very truly yours,
NIXON PEABODY, LLP

Cameron R Cloar

CRC

[4] The Federal Aviation Act ("FAAct") expressly grants the FAA the authority to issue exemptions: The Administrator may grant an exemption from a requirement of a regulation prescribed under subsection (a) or (b) of this section or any of sections 44702-44716 of this title if the Administrator finds the exemption is in the public interest. 49 U.S.C. § 44701(f).

APPENDIX A

EXEMPTION REQUEST AND EQUIVALENT LEVEL OF SAFETY SHOWINGS UNDER APPLICABLE RULES SUBJECT TO EXEMPTION

14 C.F.R. Part 21, Subpart H: Airworthiness Certificates 14 CFR § 91.203(a)(1)

Section 91.203(a)(1) requires all civil aircraft to have a certificate of airworthiness. Part 21, Subpart H, entitled Airworthiness Certificates, establishes the procedural requirements for the issuance of airworthiness certificates as required by FAR § 91.203(a)(1). Given the very small size of the aircraft and the limited operating area associated with their utilization, it is unnecessary to go through the certificate of airworthiness process under Part 21 Subpart H to achieve or exceed current safety levels.[5]

Such an exemption meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the Reform Act. The Federal Aviation Act and Section 333 of the Reform Act both authorize the FAA to exempt aircraft from the requirement for an airworthiness certificate, upon consideration of the size, weight, speed, operational capability, and proximity to airports and populated areas of the UAS involved.

In this case, an analysis of these criteria demonstrates that the eBee operated without an airworthiness certificate, under the conditions proposed herein, will be at least as safe, or safer, than a conventional aircraft (fixed wing or rotorcraft) with an airworthiness certificate. The eBee weighs 1.5 pounds. It does not carry a pilot or passenger, does not carry flammable fuel, and will operate exclusively within an area pre-disclosed and in compliance with conditions set forth herein. Operations under this exemption will be tightly controlled and monitored by the operator, pursuant to the conditions set forth in **Appendix B**, the SenseFly eBee manuals, BioSensing Systems GOM, and by local public safety requirements.

The FAA will have advance notice of all operations through the filing of NOTAMs. Receipt of the prior permission of the land owner (or lessee), the size of the aircraft, the lack of flammable fuel, and the fact that the aircraft is carried to the location and not flown there all establish the equivalent level of safety. The eBee provides at least an equivalent level of safety to that of such operations conducted with conventional manned aircraft that would be

[5] The FAA has stated that no exemption is needed from this section if a finding is made under the Reform Act that the eBee provides an equivalent level of safety when compared to aircraft normally used for the same application. These criteria are satisfied and therefore no exemption is needed. [*See*, *e.g.*, Exemption No. 11167 (an exemption from 91.203 not required for the eBee).] However, BioSensing Systems requests an exemption in the event that the FAA determines that some characteristics of the eBee fail to meet the requirements of the Reform Act.

orders-of-magnitude larger and would be carrying passengers, cargo, and flammable fuel. The safety features including the redundant sensor systems, as described in the eBee SenseFly User Manual, the eBee Inspection and Maintenance Requirements, the eBee Justification of Airworthiness and Safety Assessments, and throughout this document, underscore the importance placed on safety and reliability in the design and manufacture of the eBee.

14 C.F.R. § 91.7(a)-(b); Civil Aircraft Airworthiness

Section 91.7(a) requires that a civil aircraft must be in airworthy condition to be operated. In the four previous grants of exemption for the eBee, the FAA has concluded that an exemption was required under 14 C.F.R. § 91.7(a). In each instance, the FAA granted relief under 91.7(a) through a requirement that each petitioner ensure that the eBee is in an airworthy condition – based on compliance with the User Manual and Inspection and Maintenance Requirements – prior to every flight. [*See* Exemption No. 11167, p. 11; Exemption No. 11170, p. 17; Exemption No. 11193, p. 5; Exemption No. 11136, p. 15.] BioSensing Systems therefore requests that the FAA find similar relief under the same conditions is warranted here.

Section 91.7(b) places responsibility on the PIC to ensure an aircraft is in a condition safe for flight. In prior grants of exemption to the eBee, the FAA determined that exemption from this section was not necessary. [*See* Exemption No. 11136, p. 16.] To the extent that the FAA determines an exemption is required here, BioSensing Systems respectfully requests that the FAA find compliance with the manufacturer's manuals, and requirements of the grant of exemption, a sufficient means for ensuring that the eBee is in a condition for safe flight.

14 C.F.R. § 91.113; Right-of-Way Rules

Section 91.113 requires that vigilance be maintained by each person operating an aircraft to see and avoid other aircraft. Unlike manned aircraft, the eBee pilot is not on-board the aircraft to observe and avoid other aircraft, operating the eBee from the ground.

BioSensing Systems' proposed operating conditions will achieve an equivalent or greater level of safety. All operations will involve two individuals—one certificated private pilot as the PIC and one visual observer who will monitor the immediate and surrounding airspace of the operation for potential obstruction hazards and other possible intrusions. The eBee will also be limited to designated areas below 400 feet AGL and within a virtual fence. BioSensing Systems will notify the FAA and other pilots of the sUAS operations by NOTAM.

14 C.F.R. § 61.113(a) & (b); 61.133(a): Private Pilot Privileges and Limitations; Pilot in Command; Commercial Pilot Privileges and Limitations

Section 61.113(a) & (b) limit private pilots to non-commercial operations. Unlike a conventional aircraft that carries a pilot, passengers, and cargo, the eBee is remotely controlled with no passengers or property of others on-board. Section 61.133(a) requires an individual with a commercial pilot's license to act as pilot in command of an aircraft for compensation or hire.

BioSensing Systems respectfully proposes that operator requirements should take into account the characteristics of the particular UAS. Here, the eBee has a high degree of pre-programmed control and various built-in technical capabilities that strictly limit the potential for operation outside of the operating conditions set forth in **Appendix B** and the exemption application. The small size, endurance, range and payload capacities of the eBee mean that no passengers and/or cargo will ever be carried by the aircraft. Rather, commercial operations will be strictly limited to acquiring aerial imagery, data collection and inspections.

Considering these conditions, operating limitations and restrictions, an equivalent level of safety will be provided by allowing operation of the eBee by BioSensing Systems with individuals who possess a valid FAA private pilot certificate and Class III medical certificate. The risks associated with the operation of the eBee (given its small size, speed, operational capabilities and limitations, and lack of combustible fuel) are so diminished from the level of risk associated with commercial operations (and even operations permitted with a private pilot certificate) contemplated by Part 61 with manned aircraft, that allowing operations of the eBee as set forth in **Appendix B** meets and exceeds the present level of safety provided under 14 C.F.R. § 61.113(a)-(b), and does not call for a commercial pilot certificate as set forth in § 61.133. [Exemption Nos. 11136, p. 15 (requiring private pilot certificate and Class III medical certificate); 11170, p. 16 (same); 11193, p. 4 (same).]

14 CFR § 91.119: Minimum Safe Altitudes

Section 91.119 establishes safe altitudes for operation of civil aircraft. Specifically, 91.119(c) limits aircraft flying over areas other than congested areas to an altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

As set forth herein, the eBee will not operate at higher than 400 feet AGL. The eBee will, however, be operated to avoid congested or populated areas. Because aerial imagery and data collection work must be accomplished at relatively low altitudes and at altitudes less than 500 feet AGL, an exemption from Section 91.119(c) is needed.

The equivalent level of safety will be achieved given the size, weight, speed, and material with which the eBee are built. Also, all flights will be conducted over private and/or controlled-access property with the permission of the land owner or those who control the land. Because of the advance notice to the landowner, all affected individuals will be aware of the flights.

Compared to operations conducted with aircraft or rotorcraft weighing far more than the eBee, and carrying flammable fuel, any risk associated with these operations will be significantly less than those currently allowed with conventional aircraft operating at or below 500 feet AGL. Indeed, the low-altitude operations of the eBee will maintain separation from operations of conventional aircraft that must comply with Section 91.119.

14 C.F.R. § 91.151(a): Fuel Requirements for Flight in VFR Conditions

This regulation prohibits an individual from beginning "a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed – (1) During the day, to fly after that for at least 30 minutes; or (2) At night, to fly after that for at least 45 minutes."

The eBee is powered by a removable, rechargeable, lithium-polymer battery that provides approximately 50 minutes of powered flight. Without an exemption from § 14 CFR 91.151, flights by BioSensing Systems would be limited to 20 minutes. Given the limitations on the proposed operations and their locations, a longer time frame for flight in daylight VFR conditions is reasonable. Moreover, SenseFly has integrated "low" and "critical" battery level warnings and implemented a "Return to Home" (and "Go Land") actions in these situations.

An exemption from 14 CFR § 91.151(a) is safe and within the scope of the prior exemptions for the eBee. [*See*, *e.g.*, Exemption No. 11136, p. 17-18.] In line with the previous grants of exemption, BioSensing Systems requests that the FAA grant relief under the condition that the PIC will not begin a flight unless (considering wind and forecast weather conditions) there is enough power to fly to the first point of intended landing and, assuming normal cruise speed, land the eBee with 30% battery power remaining.

14 C.F.R. §§ 91.9(b)(2); 91.203(a)-(b); Carriage of Civil Aircraft Airworthiness Certificate and Registration

Sections 91.9(b) and 91.203(a)-(b) require an aircraft operator to carry airworthiness documents and other aircraft manuals onboard the aircraft at all times. Because the eBee is small in size and contains no cabin or flight deck, carriage of such documents and manuals is impossible.

The intent of these regulations is to ensure that the PIC has access to important documents during flight. Here, an equivalent level of safety is achieved if the PIC has access to the

applicable eBee manual(s), registration certificate and other required documents from the Ground Control Station from which he or she is conducting operations. This is consistent with a prior opinion of the FAA Office of the Chief Counsel, and other grants of exemptions for commercial UAS operations. [*See* Memorandum from Mark Bury, FAA Assistant Chief Counsel for International Law, Legislation and Regulation, to John Duncan, FAA Flight Standards Service (Aug. 8, 2014); *see also* Exemption No. 11136.]

14 C.F.R. § 91.121: Altimeter Settings

Section 91.121 requires that each individual operating an aircraft shall maintain the cruising altitude or flight level of that aircraft, as the case may be, by reference to an altimeter that is set, when operating below 18,000 feet MSL to:

- The current reported altimeter setting of a station along the route and within 100 nautical miles of the aircraft;
- If there is no station within the area prescribed in paragraph (a)(1)(i) of this section, the current reported altimeter setting of an appropriate available station;
- In the case of an aircraft not equipped with a radio, the elevation of the departure airport or an appropriate altimeter setting available before departure.

To provide an equivalent level of safety, the eBee autopilot calculates the reference altitude (ground level) with the on-board GPS during the pre-flight tests. The GPS and barometer data are merged with respect to their respective precisions. The GPS provides reliable information to correct potential barometric bias, while rapid variations in altitude are detected through the barometer. Thus, barometric bias induced by environmental factors is rejected. The FAA has granted relief from this section in three prior grants of exemption under the condition that the operator set the altimeter to zero feet AGL rather than local barometric pressure or field altitude before each flight. [Exemption Nos. 11136, p. 9; 11170, p. 20; 11193, p. 7.] In another grant of exemption, the FAA found grounds to grant an exemption from this section because the eBee can "maintain altitude via GPS, barometer input, or both and displays altitude at the takeoff location and altitude above mean sea level. Furthermore, if the [eBee] loses GPS signal or encounters a barometer error, the eBee is programmed to go to the Home point." [Exemption No. 11167, p. 13.] A similar grant of exemption is thus warranted here.

14 C.F.R. §§ 91.405(a); 407(a)(1); 409(a)(2); 417(a): Maintenance Inspections

Section 91.405(a) requires that an aircraft operator or owner "shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter...." Section 91.407 similarly makes reference to requirements in Part 43; Section

91.409(a)(2) requires an annual inspection for the issuance of an airworthiness certificate. Section 91.417(a) requires the owner or operator to keep records showing certain maintenance work that has been accomplished by certificated mechanics, under Part 43, or licensed pilots and records of approval of the aircraft for return to service.

An equivalent level of safety will be achieved because the eBee is small in size, will solely operate in controlled and predetermined areas, and is not a large, complex mechanical device. BioSensing Systems will perform all maintenance and inspections in accordance with the manufacturers' manuals and any required manufacturer Safety or Service Bulletins. In addition, the PIC will conduct a pre-flight inspection of the eBee and all associated equipment to account for all discrepancies and/or inoperable components. Maintenance will be performed and verified to address any conditions potentially affecting safe operation of the eBee and no flights will occur unless and until all flight critical components of the eBee have been found to be in a condition for safe operation. A functional flight test will be conducted following the replacement of any flight-critical components.

APPENDIX B

BIOSENSING SYSTEMS OPERATING RESTRICTIONS AND LIMITATIONS

1) Operations authorized by this grant of exemption are limited to the SenseFly eBee, which weighs approximately 1.5 pounds. Proposed operations of any other aircraft will require a new petition or a petition to amend this grant.

2) The eBee shall not be flown at a ground speed exceeding 70 knots.

3) Above Ground Level ("AGL") altitude shall be restricted to 400 feet, as indicated by the procedures specified in the eBee User Manual and the GOM. All altitudes reported to Air Traffic Control ("ATC") shall be in feet AGL.

4) The eBee shall be operated within Visual Line-of-Sight ("VLOS") of the pilot-in-command ("PIC") and visual observer at all times. The PIC must use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued medical certificate.

5) All operations must utilize a visual observer ("VO"). The VO may be used to satisfy the VLOS requirement as long as the PIC maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must confirm that the VO can perform the functions prescribed in the eBee User Manual and the GOM.

6) Any and all additional requirements identified in the exemption grant by the FAA shall be added to the GOM. The GOM must be maintained and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in the granted exemptions and the GOM, the conditions and limitations in the granted exemptions shall take precedence and must be followed. Otherwise, the operator must follow the procedures outlined in the GOM.

   The operator may update or revise its GOM. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator upon the request. The operator must also present updated and revised documents if it petitions for an extension or amendment of the granted exemptions. If the operator determines that any update or revision would affect the basis upon which the FAA granted the exemptions, then the operator must petition for amendment to its exemptions. The

FAA's UAS Integration Office (AFS-80) may be contacted if questions arise regarding updates or revisions to the GOM.

7) Prior to each flight the PIC must inspect the eBee to confirm that it is in a condition for safe flight. The PIC shall not operate the aircraft if the inspection reveals a condition that affects the safe operation of the eBee until the necessary maintenance has been performed and the eBee is found to be in a condition for safe flight. The Ground Control Station ("GCS") shall be included in the preflight inspection. All maintenance and alternations must be properly documented in the aircraft records.

8) Any eBee that has undergone maintenance or alterations that affect the eBee operation or flight characteristics (e.g., replacement of a flight critical component) must undergo a functional test flight. The PIC who conducts the functional test flight must make an entry in the eBee aircraft records.

9) BioSensing Systems must follow the manufacturer's aircraft/component maintenance, overhaul, replacement, inspection, and life limit requirements.

10) BioSensing Systems shall carry out its maintenance, inspections, and record keeping requirements, in accordance with the eBee User Manual, the eBee Inspection and Maintenance Requirements, and the GOM. Maintenance, inspection, and alterations must be noted in the aircraft logbook, including total flight hours, description of work accomplished, and the signature of the authorized PIC or technician returning the eBee to service.

11) The PIC must make a record entry in the eBee logbook or equivalent document of the corrective action taken against discrepancies discovered between inspections.

13) The PIC must possess at least a private pilot certificate and at least a current third-class medical certificate. The PIC must also meet the flight review requirements specified in 14 C.F.R. § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

14) BioSensing Systems will not permit any PIC to operate the eBee unless and until that PIC has demonstrated through the training and currency requirements set forth in the GOM, that the PIC is able to safely operate the eBee in a manner consistent with how the eBee will be operated pursuant to this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from people, vessels, vehicles and structures.

15) The eBee shall not be operated directly over any person, except authorized and consenting individuals, below an altitude that is hazardous to persons or property on the surface in the event of an eBee failure or emergency.

16) Operating of the eBee may be conducted at distances less than 500 feet from participating persons, vessels, vehicles or structures that perform an essential function in connection with these special purpose operations. Operations closer than 500 feet from the PIC, visual observer, operator trainees, and essential persons, are permitted when operationally necessary; but never so close as to present an undue hazard, per § 91.119(a).

17) Operation of the eBee must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:

a. the aircraft is operated near vessels, vehicles or structures where the land owner/controller 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.

18) If the eBee loses communications or loses its GPS signal, the eBee must return to a pre-determined location within the security perimeter and land or be recovered in accordance with the eBee User Manual and the GOM.

19) The eBee must abort the flight in the event of unpredicted obstacles or emergencies in accordance with the eBee User Manual and the GOM.

20) The PIC is prohibited from beginning an eBee flight unless (considering wind and forecast weather conditions) there is enough power to fly to the intended point of landing and, assuming normal cruising speed, land the eBee with 30% battery power remaining.

21) BioSensing Systems shall obtain an Air Traffic Organization (ATO) issued Certificate of Waiver of Authorization (COA) prior to conducting any operation. This COA will also require the filing of the NOTAM not more than 72 hours in advance, but not less than 48 hours prior to the operation.

22) All aircraft operated in accordance with the requested exemption must be identified by serial number, registered in accordance with 14 C.F.R. Part 47, and have identification (N-Number) markings in accordance with 14 C.F.R. Part 45, Subpart C. Markings shall be as large as practicable.

23) Each eBee must comply with all manufacturer System and Safety Bulletins.

24) The preflight inspection section in the eBee User Manual and the GOM shall account for all discrepancies (i.e., inoperable components, items, or equipment) not covered in the relevant pre-flight inspection sections of the eBee User Manual and the GOM.

25) The radio frequency spectrum used for operation and control of the eBee must comply with Federal Communication (FCC) or other appropriate government oversight agency requirements.

26) The documents required under 14 C.F.R. §§ 91.9 and 91.203 shall be available to the operator at the Ground Control Station of the eBee any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.[6]

27) The eBee must remain clear and yield the right of way to all other manned operations and activities at all times (including, without limitation, ultralight vehicles, parachute activities, parasailing activities, hang gliders, etc.).

28) Operations shall occur under Visual Meteorological Conditions (VMC); flights under special visual flight rules (SVFR) shall not be conducted.

29) The eBee shall not be operated from any moving device or vehicle.

30) The eBee shall 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.

31) Operations shall not occur in congested or densely populated areas. The eBee may not operate in Class B, C, D or E airspace without written approval from the controlling authority. Operations will not be conducted within a 5 NM range of the geographic center of an airport as denoted on a current FAA-published aeronautical chart unless permission has been obtained from the local control tower or, in the case of a non-towered airport, written notice has been provided to the airport's management, and the operation is conducted in accordance with a NOTAM as required by the grant of this exemption.

32) All operations shall be conducted over private and/or controlled-access property with permission from the landowner/controller or authorized representative. Permission from the landowner, controller, manager or authorized representative will be obtained for each flight to be conducted.

33) Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA shall be reported to

[6] This is consistent with an FAA Office of Chief Counsel Opinion, dated August 8, 2014, and prepared by Dean E. Griffith, AGC-220, in which it was acknowledged that the intent of 14 C.F.R. § 91.9(b) and 91.203(a), (b) is met if the PIC of the UAS has access to the aircraft flight manual, registration certificate, and other required documents from the ground control station from which he or she is operating the UAS. Memorandum from Mark Bury, FAA Assistant Chief Counsel for International Law, Legislation and Regulation, to John Duncan, FAA Flight Standards Service (Aug. 8, 2014).

the FAA's UAS Integration Office (AFS-80) within 24 hours. Accidents shall be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

34) eBee operations may not be conducted during night, as defined by 14 C.F.R. § 1.1.

APPENDIX C

FEDERAL REGISTRY SUMMARY

Pursuant to 14 C.F.R. Part 11, BioSensing Systems offers the following summary for publication in the Federal Register, should publication be necessary:

> BioSensing Systems seeks an exemption from the following rules:
>
> 14 C.F.R. Part 21, Subpart H; 14 C.F.R. § 91.7; 14 C.F.R. § 91.9(b)(2); 14 C.F.R. § 91.113; 14 C.F.R. § 61.113(a)-(b); 14 C.F.R. § 61.133(a); 14 C.F.R. § 91.119(c); 14 C.F.R. § 91.121; 14 C.F.R. § 91.151; 14 C.F.R. § 91.203; 14 C.F.R. § 91.405(a)-(b); 14 C.F.R. § 91.407(a)(1); 14 C.F.R. § 91.409(a)(1)-(2); and, 14 C.F.R. § 91.417(a).

Approval of these exemptions will permit BioSensing Systems to conduct commercial unmanned aircraft systems ("UAS") operations in farming and agricultural applications. The exemptions will enhance safety by reducing risk to the general public and property owners from the risk and hazards associated with performing equivalent work through conventional manned aircraft.