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

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

April 1, 2015

Exemption No. 11263
Regulatory Docket No. FAA−2014−0727

Mr. Jean-Christophe Zufferey
CEO
SenseFly Ltd.
Route de Genève 38
(Z.I. Châtelard Sud)
1033 Cheseaux-Lausanne
Switzerland

Dear Mr. Zufferey:

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.

**The Basis for Our Decision**

By letter dated September 18, 2014, you petitioned the Federal Aviation Administration (FAA) on behalf of SenseFly Ltd. (hereinafter petitioner or operator) for an exemption. The exemption would allow the petitioner to operate an unmanned aircraft system (UAS) to conduct mapping and 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.

**Discussion of Public Comments:**

A summary of the petition was published in the Federal Register on October 7, 2014, (79 FR 60573). Five comments were received. Four commenters, including the Association for Unmanned Vehicle Systems International (AUVSI) and the Small UAV Coalition

(Coalition), supported petition. The Air Line Pilots Association, International (ALPA) opposed it.

Individual commenters noted the petition's benefits to the agricultural market.

AUVSI cited the petitioner's experience in integrating remote controlled aircraft into the National Airspace System (NAS). AUVSI noted the various safety features of the proposed sUAS, and noted UAS have logged more than two million flight hours in Japan, Australia, and South Korea without injuries.

In support of the petition, the Coalition stated the petitioner has proposed to abide by stronger safety measures than hobby and modeler groups operating similar aircraft. The Coalition stated that it does not believe that heightened safety measures should be required for the petitioner simply because of the commercial nature of its operations. The Coalition urged the FAA to adopt an evaluation framework for UAS operations under Section 333 of Public Law 112–95 that weighs the relative safety issues and risks of UAS by class and operational circumstances, rather than adopting artificial distinctions among unmanned aerial vehicles based on commercial and noncommercial operations. The petitioner's UAS pose considerably less safety risk than larger UAS. The Coalition asserted that because UAS operations like the petitioner's pose minimal risk to safety, they should be subject to minimal and appropriate regulations.

The Coalition noted the FAA is to consider the seven factors[1] in Section 333 as a minimum. The Coalition stated the petition shows the FAA should consider factors other than those specified in Section 333, such as location, altitude of its UAS, training regimen, proven operating experience, and approvals obtained from the national aviation authorities of nine countries. The Coalition maintained that the petitioner's proposed operations satisfy the seven factors in Section 333 and include several additional mitigating factors to ensure the safety and security of the proposed UAS operations. The Coalition emphasized the FAA must evaluate each factor within the context of the petitioner's proposed UAS operations.

The Coalition also commented that the FAA should grant relief from the requirement to hold an airman certificate. The Coalition further stated that if an airman certificate is required then, at a minimum the, FAA should provide an exception from the training and testing requirements in part 61 in favor of requirements pertinent to the aircraft and operation proposed. The Coalition also asserted that in section 333 Congress intended for the FAA to consider national security with respect to the operation as opposed to addressing it through pilot certification.

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[1] Section 333(b) of P.L. 112 95 states, in part: "In making the determination under subsection (a), the Secretary shall determine, at a minimum-- (1) which types of unmanned aircraft systems, if any, as a result of their size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight do not create a hazard to users of the national airspace system or the public or pose a threat to national security; …"

The FAA notes that, as discussed in the grant of exemption to Trimble Navigation Ltd. (Exemption No. 11110), neither section 333, nor the FAA's exemption authority[2] allows the FAA to exempt pilots from the statutory requirement to hold an airman certificate as prescribed in 49 USC § 44711.

The Coalition commented that a visual observer (VO) should not be required for all small UAS operations. The Coalition further asserted that the presence of one or more VOs may allow the UAS to be operated beyond visual line of sight (VLOS) of the pilot in command (PIC) and that the petitioner's proposal to operate the unmanned aircraft (UA) within VLOS of the PIC *and/or* VO should be permitted.

The FAA notes that one of the determinations for operations under section 333 is operation within visual line of sight. The PIC must maintain VLOS while operating the UA. The FAA finds that a VO complements the PIC's capability to see and avoid other aircraft, including when the PIC may be momentarily attending to other flying tasks. The VO provides an additional level of operational safety.

ALPA expressed concern regarding several aspects of the petition. ALPA noted that while the proposed operations will avoid congested or populated areas and operate under VLOS in Visual Metrological Conditions (VMC), the petitioner did not provide detailed procedures for controlling the airspace or area of operation. Specifically, ALPA stated, "there must be means both to ensure that the sUAS remains within the Class G airspace under 400'AGL and to ensure that the hazard of other aircraft intruding on the operation is mitigated."

The FAA believes the limitations under which the petitioner will operate (i.e. VLOS and at or below 400 feet above ground level (AGL)) are sufficient mitigations to this risk so that the operations will not adversely affect safety.

ALPA noted that the petitioner does not state how the pilot and the observer will be able to communicate with each other. ALPA stated that text messaging, could have an unknown latency and extend to several minutes. ALPA further stated that voice communication with the pilot is a limited mitigation if both the pilot and observer are not able to maintain a visual observation of both the aircraft and the area. The conditions and limitations regarding PIC and VO communications address those concerns.

ALPA asserted the UAS's lithium polymer batteries have numerous associated fire and explosion hazards as outlined in DOT/FAA/AR−09/55, "Flammability Assessment of Lithium-Ion and Lithium-Ion Polymer Battery Cell Designed for Aircraft Power Usage (January 2010)," and that the safe carriage of the batteries and the mitigations in place for known risks should be addressed. The referenced study was primarily conducted to determine how certain battery cells react in a fire situation aboard manned airplanes. Given the size of

[2] 49 USC § 44701(f)

the battery and the operating conditions of the UAS, the FAA concludes that the use of a lithium polymer battery will not pose an undue safety risk for the proposed operations.

ALPA commented that command and control (C2) link failures are one of the most common failures on a UAS, and that lost link mitigations should require safe modes to prevent fly-aways or other scenarios. The FAA has inserted conditions and limitations in this exemption to mitigate the risk associated with such failures.

ALPA also noted that the petitioner's proposed operations are for "compensation or hire," and therefore contends the pilot must hold at least a current FAA commercial pilot certificate with an appropriate category and class rating for the type of aircraft being flown, as well as specific and adequate training on the UAS make and model intended to be used. Similarly, ALPA asserted a current second-class airman medical certificate should be required.

The FAA has reviewed the knowledge and training requirements of sport, recreational, private and commercial certificates and concluded that a UAS PIC holding a minimum of a sport pilot certificate, and operating under this exemption, would not adversely affect operations in the NAS or present a hazard to persons or property on the ground.

ALPA noted the petitioner must specify a means to meet see and avoid requirements in § 91.113 given the absence of an onboard pilot. The FAA notes that all flights must be operated within VLOS of the PIC and VO.

ALPA mentioned the aircraft will not have a barometric altimeter as required by 14 CFR § 91.121. ALPA stated that processes or mitigations must be in place to ensure the UA can accurately maintain altitude including engineering processes, software development and control, electronic hardware development and control, configuration management, and design assurance to ensure the aircraft and its control system(s) operate to the same level of safety as other aircraft operated commercially in the National Airspace System (NAS).

Regarding the fuel requirements of § 91.151, ALPA argued that using batteries as the only source of an aircraft's power is a substantial shift from traditional methods of propulsion, and requires further research to determine best safety practices. This comment is addressed in detail below.

ALPA opposed the petitioner's request for exemption from the minimum safe altitude requirements of § 91.119, stating all aircraft in the NAS must operate to the same high level of safety, which includes maintaining a safe altitude.

ALPA also expressed concern that the petition makes no reference to compliance with, or a request for waiver from, 14 CFR 61.195, *Flight instructor limitations and qualifications*, which defines the requirements for flight instructors. A certificated flight instructor is authorized to provide the instruction required for the certificates or ratings or currency listed in 14 CFR § 61.193. A person instructing on how to operate the UAS under the petitioner's

training program would not need to be a certificated flight instructor because the instruction is not being provided for a certificate or rating listed in § 61.193. We note that none of the UAS operations proposed by the petitioner require such flight instruction because § 61.31(*l*) allows for operation of the UAS by an airman who is current per 14 CFR § 61.56 without a category and class rating. Instruction provided toward obtaining the pilot certificate required by this exemption would need to be provided by a certificated flight instructor.

ALPA opposed the petitioners request to avoid providing aircraft documentation (critical for aircraft maintenance tracking, AD issuance, related performance information) of its small UAS. The FAA has previously determined in Grant of Exemption 11062, Astraeus Aerial, that relief from these sections is not necessary. Relevant materials may be kept in a location accessible to the PIC in compliance with the regulations.

ALPA opposed the petitioner's request for an exemption from the aircraft maintenance and record keeping requirements. ALPA asserted that the petitioner's small UAS "should comply to the same level of safety as other aircraft operated commercially in the NAS." The FAA has inserted conditions regarding this issue.

ALPA also expressed concern that the petitioner's request is not for a single specific operation or location, but for all operations of the same general type. ALPA stated that this results in a considerable increase in the FAA's oversight tasks. The FAA notes ALPA's concern and in order to minimize potential impact to the NAS, the FAA requires that each operator secure a Certificate of Waiver or Authorization (COA) which covers specific details of the petitioner's operation. The FAA recognizes that UAS integration will generate new NAS access demand and will review and adjust accordingly.

**Airworthiness Certification**

The UAS proposed by the petitioner is an eBee Unmanned Aircraft System.

The petitioner requested relief from 14 CFR part 21, C*ertification 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, 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, SenseFly Ltd. 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, SenseFly Ltd. 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 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 Colombia, 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.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 April 30, 2017, unless sooner superseded or rescinded.

Sincerely,

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

September 18th, 2014

U.S. Department of Transportation
Docket Management System
1200 New Jersey Ave., SE
Washington, DC 20590
Filed with www.regulations.gov

Re: Petition for Exemption Under Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations

Dear Madam, Sir,

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the "Reform Act") and 14 C.F.R. Part 11, SenseFly Ltd. ("SenseFly"), the manufacturer of the eBee Unmanned Aircraft System ("eBee"), on behalf of itself and future commercial operators of its eBee, seeks an exemption from the Federal Aviation Regulations ("FARs") listed below:

- 14 C.F.R. Part 21
- 14 C.F.R. 45.23
- 14 C.F.R. 45.29
- 14 C.F.R. 61.23
- 14 C.F.R. 61.3
- 14 C.F.R. 61.113(a) & (b)
- 14 C.F.R. 61.133(a)
- 14 C.F.R. 91.7(a)
- 14 C.F.R. 91.9
- 14 C.F.R. 91.109(a)
- 14 C.F.R. 91.119
- 14 C.F.R. 91.121
- 14 C.F.R. 91.151(a)
- 14 C.F.R. 91.203
- 14 CFR Subpart E (91.401 - 91.417)

The requested exemption would authorize commercial operations using the eBee for mapping and precision agriculture applications. These operations will be subject to strict operating requirements

and conditions defined by the Safety Program of the Academy of Model Aeronautics ("AMA") (see Annex B), in order to ensure at least an equivalent level of safety to currently authorized operations using manned aircrafts.

Given the technical specifications of the eBee (especially its very light weight), SenseFly and the AMA think it is relevant to use the AMA rules to meet the required level of safety of operations with the eBee. Indeed, the AMA has a proven track record in supervising operations conducted by operators using Remote Control Aircrafts and provides the most relevant expertise in terms of providing safety guidelines for operators using ultra-light remote control aircrafts. Hobbyists and modelers have been safely operating unmanned aircrafts (model aircrafts) for years in compliance with AMA standards.

By this petition, SenseFly seeks an exemption that will also authorize a commercial operator to use the eBee for commercial purposes provided the operator complies with any terms and conditions of SenseFly's exemption, including the procedures and requirements set forth in the eBee user manual and the AMA Safety Program, once the operator commits to do so in a letter filed with the FAA in this docket and available in Annex C; SenseFly requests the FAA treat the eBee user manual as proprietary under 14 C.F.R. 11.35(b) and not include this document in the public docket. Similar to the practice of other agencies, which allow non-parties to a special permit or exemption to obtain the same special permit or exemption authority by submitting a letter to the agency committing itself to comply with the terms and conditions of such permit or exemption, SenseFly requests the FAA agree to grant such authority to operators upon receipt of a written commitment filed in this docket to comply with the terms and conditions of the exemption granted to SenseFly.

Under this exemption, the operator would agree, if requested, to contact the FAA in order to provide the FAA with the details of the related missions and provide assurance that training and maintenance requirements are met.

In the alternative, SenseFly requests the FAA to agree to process expeditiously and in an abbreviated manner petitions for an exemption filed under section 333 by an operator that intends to operate the eBee and commits to comply with the terms and conditions contained in the grant of exemption as well as in SenseFly and AMA requirements and procedures. Such petitions would not be subject to the summary publication requirement or opportunity for comment, unless the petitioner seeks additional or different exemption relief.

Under the requested exemption, SenseFly and other operators of the eBee will ensure that the aircraft will be operated by an individual who meets all of the following requirements:

- Is a registered member of the AMA;
- Has passed SenseFly's training program for the eBee; SenseFly requests the FAA treat the eBee training program as proprietary under 14 C.F.R. 11.35(b) and not include this document in the public docket.
- Has completed an AMA-affiliated small unmanned aircraft systems (UAS) education and training program and has achieved an AMA UAS endorsement, or has successfully completed a small UAS education and training program provided by any FAA qualified entity.

## 1. CHARACTERISTICS OF THE AIRCRAFT

The eBee is a small (38 inches wingspan) and ultra-light (maximum take-off weight of 1.7 pounds) platform made of flexible foam that performs precision aerial mapping missions thanks to the on-board GPS and the related flight management software (eMotion) that allows the operator to plan safely and efficiently a mission in 3D, and then monitor it in real-time. Thanks to the embedded camera, protected by a foam envelope, the eBee takes a collection of high-definition still images

that are used later to generate maps and contour lines of the surveyed area.
The four main characteristics of the eBee are:

a. Very light weight

The eBee is so light that the operator can launch it by hand and let it land on almost any surface without requiring a parachute or landing net (belly land). Its low kinetic energy (60 Joules ("J") at cruise speed) also significantly reduces the risk of hazardous situations. Finally, the wings of the eBee are detachable and made of flexible foam with no sharp or hard edges and almost no internal strengthening structure.

b. Electric-powered

The eBee is electric-powered. A brushless engine technology makes it silent and reliable. The propeller is attached with two rubber bands to the body of the plane so that it can easily flex away in case of contact with any object.

c. Semi-automatic flight

The artificial intelligence incorporated within the eBee autopilot system continuously analyzes data from the Inertial Measurement Unit and from the onboard GPS and takes care of all the aspects of the flight under the supervision of the operator.

d. Option for Manual control

Additionally, the eBee provides an override capability that allows the operator to take manual actions during the flight (Go to Home, Go Land, Hold and Resume the mission) and also suspend automated operations and take manual control of the aircraft should it become necessary to respond emergent circumstances, thanks to the remote controller provided with the system.

## 2. APPLICATIONS AND ADDED VALUE OF THE EBEE

Mapping applications with the eBee may include agricultural applications, mining, construction and survey/GIS operations. The reason why the eBee solution has been very successful worldwide (thousands of operations in more than 50 countries) is that there are many operational benefits related to the use of this solution:

a. First, the eBee brings safety to daily survey operations: there is no need for the humans to access dangerous working areas anymore (mines, quarries, or polluted sites). The missions can be programmed and reproduced reliably as often as needed for regularly updated maps.

b. Second, the eBee is a cost-effective solution. It is cheaper to operate a UAS rather than an aircraft or other ground systems for the same results. Moreover, small UAS like the eBee can help Ag businesses and farmers face the growing needs of the population while reducing operational costs. The eBee also enables the ability to take up new challenges - like water or environmental management through analysis of vegetation index maps.

c. Third, users can save time and work more efficiently by using the eBee. A mission does not need a long preparation time or long deployment constraints, or long waiting time for perfect weather conditions unlike, for example, the use of satellites. Initial results are accessible directly on-site, which is impossible with images provided by satellites or manned aircrafts.

d. The eBee has social benefits too: it is eco-friendly (electric-powered), and its affordability allows many high-valued applications like data gathering for sustainability projects (agribusiness,

reforestation) or post-disaster management missions.

## 3. APPLICABLE LEGAL STANDARD UNDER SECTION 333

a. Airworthiness assessment of the eBee

SenseFly notes that the airworthiness of the eBee has already been demonstrated for different projects in the United States, involving state/federal agencies or universities (among others the New Mexico State University: https://newscenter.nmsu.edu/Articles/view/10208/nmsu-uas-flight-test-center-conducts-ebee-airworthiness-assessment, and the US Army Corps of Engineers ("USACE") New Orleans, who coordinated with the Department of Army and the FAA to obtain all authorizations required in order to operate the eBee UAS).

Moreover, SenseFly has obtained flight approvals for the eBee from the national civil aviation authority in many countries, including:

- Switzerland (flight approval for Visual Line of Sight "VLOS" operations)
- Canada (flight approval for VLOS operations)
- Australia (flight approval for VLOS operations)
- France (flight approval for Extended-VLOS operations)
- Germany (flight approval for VLOS operations)
- United Kingdom (flight approval for VLOS operations)
- Norway (flight approval for VLOS operations)
- Sweden (flight approval for VLOS operations)
- Denmark (flight approval for VLOS operations)

b. Operating Conditions

Grant of the exemption to SenseFly for the eBee, and for the benefit of operators of the eBee, will be subject to the following operating conditions, based on the operating conditions set forth by the AMA (see Annex B), and the factors the FAA is to consider under section 333. The main restrictions are summarized below:

- Operations to be conducted over private, controlled-access, or public property where approved;
- Permission from the land owner/authority required before commencing any flight;
- Operations over congested areas shall be avoided;
- Operations must not interfere with manned aircraft operations, must yield the right of way to manned aircraft, and operators must See & Avoid other aircraft and obstacles at all times;
- Operations limited to Visual Flight Rules Meteorological Conditions (VMC) and daylight hours;
- Aircraft operations must remain within Visual Line of Sight (VLOS) and will be visually monitored at all times;
- VLOS guaranteed with a GPS geo-fence around operator of 0.5 miles;
- Flight ceiling pre-programed at 400 feet AGL;
- All operations conducted within 5 miles from an airport shall only be initiated after verbal coordination with the airport authority, or air traffic control when a control tower is present at the airport;
- All operations shall comply with required permissions and permits established by territorial, state, county or city jurisdictions; including local law enforcement, fire, or other appropriate governmental agencies;
- The eBee operations will be compliant with existing safety procedures inherent to the activities of the related company.

c. Operating Requirements

The eBee is an ultra-light UAV platform made of flexible foam with no sharp or hard edge characterized by a high level of pre-programmed control and various built-in technical capabilities (programming of a geo-fence, automatic wind detection) that prevent the operator doing a mission outside of the operating limits. All flights are pre-programmed with GPS guidance and do not require human intervention; nevertheless human override is possible by clicking on one of the multiple "action" buttons or by using the remote controller provided with each eBee system. In the case of unplanned events, either the autopilot reacts immediately or the operator can choose between different pre-programmed or manual actions. Those procedures include a Flight Termination System (emergency landing procedure, triggered by the autopilot or the operator in charge: given its very light weight, the eBee will initiate a gliding approach to the ground at very low speed around the current location). Moreover, the kinetic energy of the aircraft is 60 J in-flight at cruise speed. In comparison, the kinetic energy of a football is about 110 J when thrown by hand.

Given those safety features, recognized by the U.S. Army Corps of Engineers and the national aviation authority of several countries, SenseFly requests an exemption from the airworthiness certification requirements in Part 21 and the concomitant requirements in 14 C.F.R. 91.7(a)) and 91.203 to operate an airworthy aircraft.

SenseFly also proposes that operators of the eBee should not be required to hold a commercial or private pilot certification, and hereby requests an exemption from the pilot certification requirements in the Federal Aviation Act and Part 61. Pilot certification requirements for manned aircraft are neither necessary nor appropriate in many respects for operators of small, ultra lightweight UAVs. There are undoubtedly ATP-certificated pilots who nonetheless would need training to operate a UAV safely; conversely, the UAV training regimen includes instruction for non-certificated operators in those aspects of safe operation in the National Airspace System ("NAS") that are relevant to the UAV and the UAS operation. The FAA has authority under both section 333 and its general waiver and exemption authority in 49 U.S.C. 44701(f) to waive the statutory pilot certification requirement upon a showing that the required UAS training achieves an equivalent level of safety.

To achieve as well as exceed an equivalent level of safety, operators will be required to:

- Have completed an AMA affiliated small UAS education and training program and achieved an AMA UAS endorsement, or have successfully completed a small UAS education and training program provided by any FAA qualified entity, and;
- Have passed SenseFly's training program for operation of the UAS. The manufacturer's training program for operators has been already satisfactorily reviewed through the Application for Airworthiness Qualification Level (AQL) 3 Airworthiness Release (AWR).

SenseFly also seeks an exemption from certain requirements in Parts 45 and 91 that are impractical as well as unnecessary for UAS operations. Please see Annex A for a detailed explanation of each regulation from which an exemption is sought and the equivalent level of safety showing.

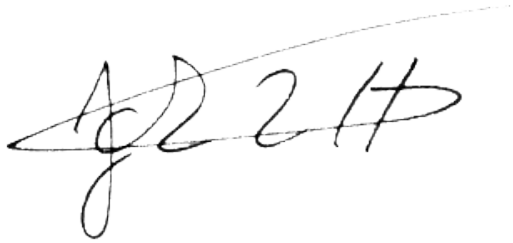
## 4. CONCLUSION

SenseFly, in association with the Academy of Model Aeronautics who has a deep and well-known experience in terms of safe integration of remote controlled aircrafts in the National airspace for low-altitude operations, provides here adequate justification for the granting of the requested exemption allowing safe commercial operations of the eBee in the NAS.

SenseFly offers in this petition a pragmatic approach to allow the efficient operation of ultra-light UAVs pursuant to FAA, AMA, and SenseFly safety requirements and conditions.

Yours sincerely,

Jean-Christophe Zufferey, SenseFly CEO



**ANNEX A: EXEMPTION REQUEST AND EQUIVALENT LEVEL OF SAFETY SHOWINGS UNDER APPLICABLE RULES SUBJECT TO EXEMPTION**

SenseFly requests an exemption from the following regulations as well as any additional regulations that may technically apply to the operation of the eBee:

**14 C.F.R. Part 21, Subpart H: Airworthiness Certificates**
**14 CFR § 91.203**

Section 91.203 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). Given the size of the eBee, its very light weight (the maximum take-off weight is 1.7 pounds) and the limited operating area associated with its utilization, it is unnecessary to go through the certificate of airworthiness process under Part 21 Subpart H in order to achieve or exceed current safety levels.

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. An analysis of these different criteria demonstrates that the eBee operated without an airworthiness certificate, under the conditions proposed in that exemption, will be at least as safe, or safer, than a conventional aircraft with an airworthiness certificate. A proprietary risk assessment for operations with the eBee, which demonstrates that assertion, is also being submitted to the FAA as part of this application. SenseFly requests the FAA treat the eBee risk assessment as proprietary under 14 C.F.R. 11.35(b) and not include this document in the public docket.

**14 C.F.R. § 45.23 & 14 C.F.R. § 45.29: Display of marks; size of marks**

These regulations provide that each aircraft must display "N" and the aircraft's registration number in letters at least 3 inches high. Additionally, the aircraft must display the word "EXPERIMENTAL" in letters at least 2 inches high near the entrance to the cabin, cockpit, or pilot station.

Given the size of the eBee (wingspan of 37.8 inches), this requirement is impossible to match.

The equivalent level of safety will be achieved by having the upper part of the eBee stick with a copy of the AMA membership of the operator in charge. The AMA agrees to provide 2 original copies of the AMA license to every eBee operator.

**14. CFR §61.23: Medical certificates: Requirement and duration**

Regulations provide that a person:

(1) Must hold a first-class medical certificate:

- When exercising the pilot-in-command privileges of an airline transport pilot certificate;
- When exercising the second-in-command privileges of an airline transport pilot certificate in a flag or supplemental operation in part 121 of this chapter that requires three or more pilots; or
- When serving as a required pilot flight crewmember in an operation conducted under part 121 of this chapter if the pilot has reached his or her 60th birthday.

(2) Must hold at least a second class medical certificate when exercising:

- Second-in-command privileges of an airline transport pilot certificate in part 121 of this chapter (other than operations specified in paragraph (a)(1)(ii) of this section); or
- Privileges of a commercial pilot certificate

Given the size of the eBee, its structure, the limited flight area, and the safety features integrated in the autopilot (among others the Flight Termination System), SenseFly believes that an Equivalent Level of Safety can be reached if the operator has a valid driver's license.

**14 C.F.R. § 61.3: Requirements for certificates, ratings and authorizations**
**14 C.F.R. § 61.113(a) & (b); 61.133(a): Private Pilot Privileges and Limitations; Pilot in Command; Commercial Pilot Privileges and Limitations**

The regulation provides that no person may serve as a required pilot flight crewmember of a civil aircraft of the United States, unless that person:

(1) Has a pilot certificate or special purpose pilot authorization issued under this part in that person's physical possession or readily accessible in the aircraft when exercising the privileges of that pilot certificate or authorization. However, when the aircraft is operated within a foreign country, a pilot license issued by that country may be used.

The regulation provides also that no person that holds a private pilot certificate may act as pilot in command of an aircraft for compensation or hire. Subparagraph (b) allows a private pilot to act as pilot in command of an aircraft in connection with any business or employment if:

(1) The flight is only incidental to that business or employment;
(2) The aircraft does not carry passengers or property for compensation or hire.

Given the safety features of the eBee and the fact that the missions are pre-programmed and monitored in real-time with a specific flight management software (eMotion), SenseFly proposes that operators of the eBee should not be required to hold a commercial or private pilot certification. Instead, operators should be required to:

- Have completed an AMA affiliated small unmanned aircraft systems education and training program and achieved an AMA UAS endorsement, or have successfully completed a small UAS education and training program provided by any FAA qualified entity, and;
- Have passed SenseFly's training program for operation of the UAS. The manufacturer's training program for operators has been already satisfactorily reviewed through the Application for Airworthiness Qualification Level (AQL) 3 Airworthiness Release (AWR).

The equivalent level of safety will be achieved by having an operator trained by the AMA (or any FAA qualified entity) and SenseFly, and using the integrated features of the aircraft to maintain a high level of safety during the different missions.

**14 C.F.R. § 91.7(a): Civil aircraft airworthiness**

This regulation requires that no person may operate a civil aircraft unless it is in airworthy condition. Should the exemption be granted allowing commercial operation of the eBee without an airworthiness certificate, no standard will exist for airworthiness of the eBee. Given the size of the aircraft and the previous airworthiness assessments given to the eBee, among others:

- New Mexico State University: https://newscenter.nmsu.edu/Articles/view/10208/nmsu-uas-flight-test-center-conducts-ebee-airworthiness-assessment
- USACE New Orleans, who coordinated with the Department of Army and the FAA to obtain all authorizations required in order to operate the eBee UAS for levee system monitoring,

documentation of construction progress, and extensive oblique photography of USACE structures & activities.

An equivalent level of safety will be achieved by insuring compliance with the eBee user manual prior to each flight.

**14 C.F.R. § 91.9: Civil aircraft flight manual, marking, and placard requirements**

This regulation provides that no person may operate an aircraft unless a current, approved flight manual is in the aircraft. SenseFly assumes that the intent of this requirement is to ensure that flight manual information is available to the aircrew while operating the aircraft. SenseFly requests an exemption to this requirement since the aircraft is not only too small to carry documentation, but the documentation would not be available to the crew.

The equivalent level of safety will be achieved by keeping a hard copy of the eBee user manual in the eBee transport box.

**14 C.F.R. § 91.109(a): Flight Instruction**

The regulation provides that "No person may operate a civil aircraft that is being used for flight instruction unless that aircraft has fully functioning dual controls."

Flight instruction will be accomplished through an elaborated training program, using first the simulation mode of the flight management software eMotion. The equivalent level of safety during the in-flight training will be achieved by the manufacturer or affiliate providing the training as described in the eBee training program and through the use of experienced and qualified instructors familiar with the eBee and also members of the AMA.

**14 CFR § 91.119: Minimum Safe Altitudes**

The regulation provides that over sparsely populated areas the aircraft cannot be operated closer than 500 feet to any person, vessel, vehicle, or structure. Since the eBee will be operating at a maximum of 400 feet AGL, SenseFly cannot comply with this requirement.

The equivalent level of safety will be achieved because the eBee will only fly over private property with the permission of the landowner. The operator will define before every flight a working area radius and a flight area ceiling, preventing the eBee to go beyond the flight area. The landowner and the persons who may be on the ground in the flight area will be briefed of the expected route of flight and the associated risks to persons and property on the ground. Due to the small size of the eBee, the material with which the eBee is built and its specific safety procedures (among others ground detection), the hazard to persons, vessels, vehicles, and structures is not comparable to manned aircraft and should be considered in granting the exemption. Moreover, the aircraft will not be operated over congested areas or over any open-air assembly of persons.

**14 CFR 91.121: Altimeter settings**

This section requires that each person 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 then used to calculate the altitude in-flight.

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

The regulation provides that no person may begin a flight in an airplane under day-VFR conditions unless there is enough fuel to fly to the first point of intended landing and to fly after that for at least 30 minutes. As the eBee is electric-powered, this requirement is inapplicable.

In any event, given the area of operation for the eBee, SenseFly believes that an equivalent level of safety is already achieved with the specific procedure preventing the eBee to accept a take-off order is the battery level is below a given value. Moreover, SenseFly has integrated “low” and “critical” battery level warnings and implemented a “return to Home” (and “Go Land”) actions in these situations.

**14 C.F.R. § 91.203 (a) & (b): Carrying Civil Aircraft Certification and Registration**

This regulation provides as follows:

- No person may operate a civil aircraft unless it has an appropriate and current airworthiness certificate.
- No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under §91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

To obtain an equivalent level of safety and meet the intent of 91.203, SenseFly proposes that documents deemed appropriate for this aircraft by the FAA will be co-located with the operator at the ground control station in the eBee transport box and available for inspection upon request. In order to identify the aircraft, SenseFly proposes that a copy of the AMA membership of the operator will be permanently affixed to the eBee on the upper side of the body.

**14 CFR Subpart E (91.401 - 91.417): Maintenance, Preventive Maintenance, and Alterations**

The regulation provides that the operator is primarily responsible for maintaining the aircraft in an airworthy condition, including compliance with Parts 39 and 43. Paragraphs 91.407 and 91.409 require the aircraft to be "approved for return to service by a person authorized under 43.7" after maintenance and inspection. Section 91.409 requires an annual inspection for the issuance of an airworthiness certificate. Section 91.417 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.

SenseFly proposes that the maintenance of the eBee will be accomplished by the owner or the operator according to the eBee user manual. An equivalent level of safety will be achieved because the eBee is small in size, it is not a complex mechanical device and does carry any external payload. Moreover, the operator is the person most familiar with the aircraft and is best suited to maintain the aircraft in an airworthy condition and to ensure an equivalent level of safety. Finally, before every flight, the eBee automatically runs a sequence of pre-flight tests to make sure that every sensor and every critical part is operating properly. If a problem is detected, the eBee will not be able to be switched-on and a message error is displayed on the main screen of eMotion. The owner or the operator can then refer to the eBee user manual to troubleshoot this issue. Several

parts of the eBee are easily interchangeable (propellers, wings), which allows the operator to make sure the wings and propulsion system are always airworthy when a mission is initiated.

## ANNEX B: ACADEMY OF MODEL AERONAUTICS SAFETY REQUIREMENTS

http://www.modelaircraft.org/files/105.pdf

http://www.modelaircraft.org/files/540-D.pdf

http://www.modelaircraft.org/files/560.pdf

**ANNEX C: PROPOSITION OF DOCUMENT TO BE FILLED OUT BY EVERY OPERATOR**

Section 1: Organization Contact Details

- Organization:
- Organization Address:
- Organization Phone Number:
- Website of the Company:

- Organization Contact Full Name:
- Contact Phone number:
- Contact email address:

Section 2: Operator(s) Contact Details

- Operator First Name:
- Operator Middle Name (optional):
- Operator Last Name:
- Primary Phone Number:
- Email address:
- Secondary Phone Number:
- AMA Membership Number:

*Note: Add the above-requested information for each operator.*

Section 3: Operator's Certifications

1.a. The operator(s) has (have) successfully accomplished AMA's training regimen and received an AMA endorsement (please provide a copy of the certificate(s)); or has (have) successfully accomplished a training program performed by a FAA qualified entity:

Yes: ☐ / No: ☐

1.b. The operator(s) has (have) successfully accomplished SenseFly specific training program for the related UAV (please provide a copy of the certificate(s)):

Yes: ☐ / No: ☐

2. The operator(s) has (have) reviewed the operating requirements described in the Petition for Exemption filled out by SenseFly and agrees to comply with those operating requirements:

Yes: ☐ / No: ☐

Section 4: Description of Operations

- Enter the number of UAVs you are registering:
- Enter the serial numbers, if possible, for the UAVs you are registering:
- Briefly describe the purpose of your proposed operation(s):
- Describe the times of day in which you plan to operate:
- Enter how many observers will be present for each UAV type of operation:

Section 5: Description of Additional Operating Procedures

- Describe how you will maintain communication with operators on the ground:
- Describe the additional safety procedures you propose to use:
- Describe any other factors you deem important:

Date:

Full name:

Signature: