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

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

June 5, 2015

Exemption No. 11764
Regulatory Docket No. FAA–2015–0974

Mr. Mark S. Mattox
President
EMC, Inc.
2472 Sunset Drive
Grenada, MS 38901

Dear Mr. Mattox:

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

By letter dated April 8, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of EMC, Inc. (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct precision aerial mapping and survey applications.

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[1]. 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, EMC, Inc. is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

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

Conditions and Limitations

In this grant of exemption, EMC, Inc. is hereafter referred to as the operator.

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

1. Operations authorized by this grant of exemption are limited to the SenseFly eBee when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.

2. Operations for the purpose of closed-set motion picture and television filming are not permitted.

3. The UA may not be operated at a speed exceeding 87 knots (100 miles per hour). The exemption holder may use either groundspeed or calibrated airspeed to determine compliance with the 87 knot speed restriction. In no case will the UA be operated at airspeeds greater than the maximum UA operating airspeed recommended by the aircraft manufacturer.

4. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL). Altitude must be reported in feet AGL.

5. The UA must be operated within visual line of sight (VLOS) of the PIC at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license.

6. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the duties required of the VO.

7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The operating documents must be accessible during UAS operations and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents, the conditions and limitations herein take precedence and must be followed.

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

8. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics, e.g., replacement of a flight critical component, must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.

9. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.

10. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the UAS is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, e.g., inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.

11. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the aircraft and aircraft components.

12. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.

13. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

14. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be

operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. PIC qualification flight hours and currency must be logged in a manner consistent with 14 CFR § 61.51(b). Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building) and determining the PIC's ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption are permitted under the terms of this exemption. However, training operations may only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights, all persons not essential for flight operations are considered nonparticipants, and the PIC must operate the UA with appropriate distance from nonparticipants in accordance with 14 CFR § 91.119.

15. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.

16. The UA may not operate within 5 nautical miles of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD) or for airports not denoted with an ARP, the center of the airport symbol as denoted on the current FAA-published aeronautical chart, unless a letter of agreement with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.

17. The UA may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.

18. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the private or controlled-access property.

19. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.

20. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UA to conduct the intended operation and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater.

21. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.

22. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification

(N−Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.

23. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under 14 CFR §§ 91.9 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.

24. The UA must remain clear and give way to all manned aviation operations and activities at all times.

25. The UAS may not be operated by the PIC from any moving device or vehicle.

26. All Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:
    a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner ensuring the safety of nonparticipating persons; and
    b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

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

27. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.

28. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS−80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.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 June 30, 2017, unless sooner superseded or rescinded.

Sincerely,

John S. Duncan
Director, Flight Standards Service

Enclosures

Project Officer: _____

MR MARK S MATTOX
PRESIDENT
EMC INC
2472 SUNSET DRIVE
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Exemption Request
Under Section 333 of the FAA Reform Act & Part 11 of the Federal Aviation Regulations

April 2015

Prepared for:
U.S. Department of Transportation, Docket Operations
West Building Ground Floor, Room W12-140
1200 New Jersey Ave., SE
Washington, DC 20590

Prepared by:

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**** Documents were submitted confidentially for proprietary reasons & will not be available to the public***

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SPECIALISTS IN SURVEYING & MAPPING

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April 8, 2015

U.S. Department of Transportation, Docket Operations
West Building Ground Floor, Room W12-140
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 Madam or Sir,

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the "Reform Act") and 14 C.F.R. Part 11, EMC, Inc. ("EMC"), a small business located in Grenada, Mississippi, seeks an exemption for the eBee Unmanned Aircraft System manufactured by SenseFly SA of Switzerland ("eBee") from the Federal Aviation Regulations ("FARs") listed below:

- 14C.F.R. 21
- 14C.F.R. 45.23
- 14C.F.R. 45.29
- 14C.F.R. 61.133(a)
- 14C.F.R. 91.7(b)
- 14C.F.R. 91.9(b)(2)
- 14C.F.R. 91.109(a)
- 14C.F.R. 91.119
- 14 C.F.R. 91.121
- 14C.F.R. 91.151(a)
- 14 C.F.R. 91.203 (a) & (b)
- 14 CFR Subpart E (91.401 - 91.417)

The requested exemption would authorize unmanned aircraft operations for the purpose of precision aerial surveys using the eBee for applications by EMC. These operations will be subject to strict operating requirements and conditions defined by the safety code of the Academy of Model Aeronautics (see Annex B), in order to ensure at least an equivalent level of safety to currently authorized operations using manned aircrafts.

Over the last 30 years, EMC performed thousands of land and hydrographic surveys for federal, state and local government entities, as well as various private and public companies in over forty-five (45) states. EMC is a multi-disciplined surveying company offering turn-key solutions for both routine and complex surveying challenges serving clients in multiple industries, including, but not limited to transportation (highways, railroad, ports, harbors and waterways), construction, telecommunication, oil and gas, power suppliers, and the state and federal governments. The requested exemption would authorize commercial operations using the eBee for the efficient production of precision, valuable, high-resolution, still photos; which would be of significant value with the accurate data in providing precision mapping and survey applications.

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The electric-powered, unmanned aspect of aerial technology of the eBee provides a much safer solution to aerial surveying in that:

a. The flight crews' lives will not be put at risk of an accident.
b. The low and slow flight of an extremely light weight product with safety measures programmed into the eBee's operating system drastically reduces the chance of the general public being harmed.
c. Since the eBee is electric-powered, there is absolutely none of the risks associated with fuel igniting.
d. The eBee will eliminate the possibility of injuries of EMC's surveyor crew that would require accessing hard to reach areas and maneuvering on terrain that poses potential safety hazards.

The following appendices are included in this document for reference purposes. EMC requests that the FAA treat these documents as proprietary under 14 C.F.R. 11.35(b) and not include these appendices in the public docket:

Appendix A: SenseFly – eBee User Manual Ver.15
Appendix B: SenseFly - eBee Maintenance Procedures
Appendix C: SenseFly - eBee Training Documentation
Appendix D: SenseFly – eBee Justification of Airworthiness and Safety Assessment

These operations will be subject to strict operating requirements defined in the eBee user manual (EMC requests the FAA treat the eBee training program as proprietary under 14 CFR 11.35(b) and not include this document in the public docket) and conditions defined by the Safety Code of the Academy of Model Aeronautics (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 very light weight, eBee, and the type of operations; EMC believes it is relevant to use the Academy of Model Aeronautics (AMA) rules and guidelines to meet the required level of safety of future operations with the eBee. (See Annex B) Indeed, the AMA has a proven track record in supervising operations conducted by operators using remote controlled aircrafts and provides the most relevant expertise in terms of providing safety guidelines for operators using ultra-light remote controlled aircrafts.

The eBee will be operated by an individual who fulfills the following requirements:

- The pilot in charge, ("PIC"), will maintain a current private pilot's license, a current driver's license issued by the state and a valid third-class airman medical certificate
- The PIC will be accompanied by a safety/visual observer, ("VO"), as he compliments the PIC's capabilities to see and avoid other aircraft (per 91.113) and provides an additional level of operational safety; and thus the UA must never be operated beyond the actual visual capabilities
- The VO's responsibilities will be as follows:
  - initially launch the vehicle before turning it over to the PIC
  - monitor the authorized airspace to identify errant aircraft or unsafe conditions that might exist during the flight
  - maintain constant verbal communication with the PIC to alert him to changing conditions
  - in the event of an emergency, calling the appropriate agency overseeing the airspace

EMC takes pride in providing a safe working environment for our employees, crew members and the general public at all times. We currently have excellent safety procedures in place, as well as an outstanding safety director within our company.

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1. CHARACTERISTICS OF THE AIRCRAFT

The eBee is a small (37.8 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. (See Appendix A)

The four main characteristics of the eBee are:

1. 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 impact energy (38 J in case of a controlled emergency landing) 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. The limited weight and construction materials used, reduce the potential for harm to person(s) or damage to property in the event of an incident or accident.

2. Electric-powered

The eBee is electric powered. A brushless engine technology makes it silent and reliable. The propeller is attached with a rubber band to the body of the plane so that it can easily flex away in case of contact with any object. The unmanned aircraft (UA) carries no fuel and therefore the risk of fire following an incident or accident due to fuel spillage is eliminated.

3. 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. The pilot and crew will be remotely located from the aircraft. The risk to an onboard pilot and crew during an incident or accident is eliminated with the use of a UAS for the proposed operation.

4. 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. The eBee has the capability to perform an emergency landing and land safely after experiencing certain in-flight contingencies or failures with undue hazard to persons or property on the surface if the power unit should fail. The eBee is also capable of responding to a loss of global positioning system(GPS) or a lost-link event with pre-coordinated automated landing maneuvers. These safety features provide an equivalent level of safety compared to a manned aircraft holding a restricted airworthiness certificate performing a similar operation.

All maintenance and upkeep required to ensure the safe operation of the eBee will be based upon completion of appropriate inspections(s) such as pre-flight.

2. APPLICATIONS

EMC has purchased the SenseFly eBee and respectively requests exemption to operate the eBee for precision aerial surveying using the onboard camera. The value that the eBee could bring to the surveying and mapping industry is invaluable. EMC intends to perform aerial acquisition and research nationwide to meet the surveying and mapping demands of our clients in a more timely, accurately, efficient and most importantly, safer manner. In support of our state and federal government agencies with an excellent, work history with

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the U. S. Army Corps of Engineers, the capabilities and time saved using the eBee are much more feasible when compared to the limited access to areas that arise from time to time. With the safety of our nation's citizens in mind, and in the event of a natural disaster, such as Hurricane Katrina and the limited to access to areas for an extended period of time, the eBee could literally save lives by allowing it to take to the skies to quickly and safely meet the area's immediate/urgent surveying needs.

3. APPLICABLE LEGAL STANDARD UNDER SECTION 333

a. Airworthiness assessment of the eBee (See Appendix D)

EMC 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 USACE District, 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 obtained flight approvals for the eBee (delivered by national civil aviation authorities) in many countries:

Switzerland (flight approval for 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 requirements

Grant of the exemption to EMC for the eBee will be subject to the following operating conditions, based on the operating conditions set forth by the Academy of Model Aeronautics (see Annex B).
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 or densely populated areas will be avoided and stand-off distances imposed of at least 500' from all nonparticipating persons, vessels, vehicles and structures, unless:
  - barriers or structures are present that would sufficiently protect non-participating persons in the event of an accident; and/or
  - the owner/controller of such structures has granted permission and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard; and
  - Operations, nearer to the PIC, VO, operator trainees or essential persons, do not present an undue hazard to those persons.
- Operations must not interfere with manned aircraft operations, must remain a safe distance from, yield the right of way to manned aircraft, and operators must "sense and avoid capability" regarding other airborne aircraft and obstacles at all times
- Operations will be 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

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- Flight ceiling pre-programed at 400 feet
- 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. Operator Requirements (See Appendix C)

- PIC will maintain a current driver's license, private pilot license and medical certification
- In addition, the PIC and VO will also have successfully completed annual (recurrent) training in accordance with the operating documents.

Both the PIC and the VO will have successfully passed the manufacturer's training program before operating the eBee; **EMC 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.** Furthermore, the PIC and the VO will successfully complete the training at the Unmanned Vehicle University of Phoenix, Arizona, and receive a UAV Pilot Training Certificate. This program consists of 16 hours of ground school, 10 hours of training in a small UAV flight simulator and 24 hours of flight training.

4. CONCLUSION

By moving surveying and mapping functions from a ground-based, human enterprise to the aerial platform of the eBee, EMC will have the ability to collect an enormous amount of data in a fraction of the time that would be consumed in a ground based effort. Information collected by the eBee will change the entire decision making process and work flow. Instead of days to collect and process the ground based data EMC can collect eBee preliminary data and begin to provide intelligent data to our clients at a near real time rate of information exchange. Improving data collection by utilizing the eBee as a surveying platform allows our clients to stand with our operator and begin the process of analysis at the very moment the data is collected.

In addition to increasing efficiency, the unmanned eBee is much safer for the operators when compared to the risks of the crew of a manned aircraft; as well as the general public with the fuel risks of a manned aircraft fly in the skies being completed alleviated. Due to its unique, lightweight and compact design, the SenseFly eBee can be assembled and deployed in less than five (5) minutes after arriving onsite. It can perform its mission accurately, effectively, efficiently, and most of all, safely.

Your time and consideration is very much appreciated.

Sincerely,

Mark S. Mattox, PLS, CH
President, EMC, Inc.

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

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

14 CFR 21 –CERTIFICATION PROCEDURES FOR PRODUCTS AND PART Subpart H – Airworthiness Certificates (Appendix D) 14 CFR 91.203(a)(1)

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. EMC requests the FAA treat the eBee risk assessment as proprietary under 14 CFR 11.35(b) and not include this document in the public docket.

14 CFR 45.23 Display of marks and 45.29 Size of Marks

Under these regulations an aircraft must display the Roman capital letter "N" and the aircraft's registration number in letters at least 3 inches high. Additionally, an aircraft must display the word "EXPERIMENTAL" in letters at least 2 inches high near the entrance to the cabin, cockpit, or pilot station.

Due to the size of our eBee having a wing-span of 96 cm (37.8 in.) and a wing-area of 0.25m^2 (387.50 in^2), this requirement is impossible to achieve. Furthermore, our eBee does not have an entrance in which the word "Experimental" could be placed, and we may not be provided an FAA registration number for our eBee. To achieve an equivalent level of safety, EMC proposes setting a ground station where all of the aircraft's registrations (if applicable) and manuals will be centralized in the eBee's storage/carrying case which will be with the operator at all times when in use. Since our eBee will operate in Visual Line of Sight (VLOS), this station will be visible to anyone that observes the aircraft and chooses to investigate its point of origin.

14 CFR 61.113 Private Pilot Privileges and limitations: Pilot In Command (PIC)

Under these current regulations, civil operation for compensation or hire required a PIC holding a commercial pilot certificate per 14 CFR 61. Based on the private pilot limitations in accordance with pertinent parts 14 CFR 61.113 (a) and (b), a pilot holding a private certificate cannot act as a PIC of an aircraft for compensation or hire, unless the flight is only incidental to a business or employment.

Given the safety features of the eBee, and the fact that the missions are pre-programmed and monitored in real-time with the flight management software, EMC proposes that the PIC hold a private pilot certificate and a third-class airman medical certificate. The PIC will obtain the necessary airmanship skills to operate the eBee via training program(s). This will enable the PIC to safely operate the eBee in all conditions including evasive and emergency maneuvers, and maintaining appropriate distances from structures, vehicles, person, etc.

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14 CFR 91.7 Civil aircraft airworthiness (See Appendix D)

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 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 and the 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
In addition, EMC will strictly follow all of the guidelines for all pre-flight inspections, safety precautions and product maintenance procedures, as stated in Appendix A and Appendix B, which will include a method for determining the airworthiness of the aircraft; and therefore request relief from 14 CFR 91.7(a). Our PIC will be responsible for and capable of determining whether the aircraft is in a condition for safe flight; so we are not requesting relief from 14 CFR 91.7(b).

14 CFR 91.9 (b)(2): 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. EMC assumes that the intent of this requirement is to ensure that flight manual information is available to the aircrew while operating the aircraft. EMC requests an exemption to this requirement since, the aircraft is not only too small to carry documentation; the documentation would not be available to the crew.

The equivalent level of safety will be achieved by keeping a hard copy of the flight manual in the eBee's storage/transportation case. This case will be located at the proposed ground station in the PIC's possession during the operation of the eBee.

14 CFR 91.109(a) and 14 CFR 91.319(a)(1) - Flight instruction; Simulated instrument flight and certain flight tests.

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 as set forth in Exhibit 2. The equivalent level of safety during the training will be achieved by the manufacturer providing the training as outlined in Exhibit 2 and through the use of experienced and qualified operators familiar with the eBee. (See Appendix C)

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 aircraft will be operating at a maximum of 400 feet AGL, the eBee cannot comply with this requirement.

To acquire an equivalent level of safety, we 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 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 and the material with which the eBee is built, 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. The aircraft will be operated at an altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.

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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 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. Given the limited altitude of the proposed missions, we feel that an equivalent level of safety is achieved; and we request relief from 91.121.

14 CFR 91.151: 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.

The eBee is a battery-operated aircraft with a maximum duration of flight from a single battery charge of 50 minutes. Furthermore, the area of operation for the eBee will never fly over 1/2 nm from the point of intended landing. A full battery charge allows us to meet the reserve energy requirements. We also believe that an equivalent level of safety is already achieved with the specific procedure preventing the eBee to accept a "take-off" order if the battery level is below a given value. Additionally, the eBee has integrated "low" and "critical" battery-level warnings; and has implemented a "return to Home" and "Go Land" command actions, should these non-anticipated situations ever arise.

14 CFR 91.203 (a) & (b) Civil aircraft: Certifications required

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.

The eBee weighs only 1.7 pounds (max take-off weight). As such, there is no ability or place to carry certification and registration documents or to display them on the UAS. In addition, there is no pilot or passengers on board the aircraft. To obtain an equivalent level of safety and meet the intent of 91.203, EMC propose that documents deemed appropriate for this aircraft by the FAA will be located with the operator at the proposed ground control station in the eBee's carrying case and available for inspection upon request.

14 CFR Subpart E (91.401 - 91.417) - Maintenance, Preventive Maintenance and Alterations (See Appendix B)

The eBee is not the type of equipment that would require a certified mechanic's skills or knowledge. EMC proposes that the maintenance of the eBee be accomplished by the owner/operator according to the maintenance manual, provided by SenseFly. **EMC 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.**

An equivalent level of safety will be achieved because the eBee is small in size, it is not a complex mechanical device, it will carry no external payload, and it will operate only in restricted predetermined areas. Moreover, the operator is the person most familiar with the aircraft and is best suited to maintain the aircraft in an

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airworthy condition and to ensure an equivalent level of safety. Finally, before every flight, the eBee runs automatically a sequence of pre-flight tests to make sure that every sensor and every critical part is running 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 operator can then refer to the maintenance manual to troubleshoot this issue. Most 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.

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ANNEX B: ACADEMY OF MODEL AERONAUTICS SAFETY REQUIREMENTS

Academy of Model Aeronautics National Model Aircraft Safety Code
http://www.modelaircraft.org/files/105.pdf

"See and Avoid" Guidance
http://www.modelaircraft.org/files/540-D.pdf

Radio Controlled Model Aircraft **Operation Utilizing Failsafe, Stabilization and Autopilot Systems**
http://www.modelaircraft.org/files/560.pdf

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Appendix A

SenseFly - eBee User Manual Rev.15
Confidential (A thru D will be mailed)

**** Documents were submitted confidentially for proprietary reasons & will not be available to the public***

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Appendix B

SenseFly - eBee Maintenance Procedures
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Appendix C

SenseFly – eBee Training Documentation
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Appendix D

SenseFly – eBee Justification of Airworthiness and Safety Assessment Confidential (A thru D will be mailed)

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