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

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

April 17, 2015

Exemption No. 11374
Regulatory Docket No. FAA–2015–0091

Mr. Reed Larson, PE
Vice President of Mining Services
Bowman Consulting Group, LTD
3863 Centerview Drive, Suite 300
Chantilly, VA 20151

Dear Mr. Larson:

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 January 13, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Bowman Consulting Group, 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 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.

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 relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*, and any associated noise certification and testing requirements of part 36, is not necessary.

The Basis for Our Decision

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

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

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

Our Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701, delegated to me by the Administrator, Bowman Consulting Group, 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, Bowman Consulting Group, 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 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 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

Bowman
CONSULTING

January 13, 2015

United States Department of Transportation
Docket Management System
1200 New Jersey Avenue SE
Washington, DC 20590

Filed at www.regulations.gov

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

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the "Reform Act") and 14 C.F.R. Part 11, Bowman Consulting Group, Ltd (BCG), seeks an exemption from Federal Aviation Regulations (FARs) detailed below for the eBee Unmanned Aircraft System ("eBee") manufactured by SenseFly SA of Switzerland:

- 14 CFR 61.113(a) and (b)
- 14 CFR 91.7(a)
- 14 CFR 91.119(c)
- 14 CFR 91.121
- 14 CFR 91.151(a)(1)
- 14 CFR 91.405(a)
- 14 CFR 91.407(a)(1)
- 14 CFR 91.409(a)(1) and (2)
- 14 CFR 91.417(a) and (b)

BCG provides consulting engineering and surveying services to clients in the land development, oil & gas, transportation, power & energy and mining sectors. BCG's mining clients own and operate open pit mines throughout the United States, predominantly in the southwest. The surveying services provided to these mining clients routinely include topographic and feature mapping that is acquired through aerial photogrammetry. Use of the eBee UAS to produce this mapping creates benefits to the mining and construction industries and to the environment which serve the public interest. Specifically, use of the eBee UAS provides the following advantages:

- Safety: The eBee UAS is constructed of flexible foam and weighs less than two pounds. The eBee operates on a sealed lithium-polymer battery and does not use combustible fuel. Use of the eBee UAS on mine sites allows acquisition of topographic and feature data that is otherwise unobtainable due to steep terrain, pit walls, high walls and other aggressive topography typical of active mine sites.

- Cost: Use of the eBee provides a competitive advantage to our clients because they are able to acquire survey data at an estimated savings of 30 to 40 percent compared to conventional aerial photogrammetry via manned aircraft.

- Schedule: The workflow for conventional manned aerial photography is such that the client receives deliverables from several days to several weeks after flight date. The eBee UAS includes post-processing

software that resides on BCG workstations that allows BCG to deliver the final mapping product to the client from several hours to a few working days after flight date.

- Quality: The eBee UAS, at normal flight heights, acquires imagery at a resolution of less than one inch per pixel. This resolution provides excellent clarity in the resulting ortho-photos, and also results in very accurate survey deliverables.

The requested exemption would authorize commercial operations using the eBee for mapping and survey applications. These operations will be subject to strict operating requirements defined in the eBee user manual (BCG requests that 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) in order to ensure at least an equivalent level of safety to currently authorized operations using manned aircrafts.

UAS CHARACTERISTICS

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 onboard GPS and the related flight management software (eMotion) that allows the operator to safely and efficiently plan 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:

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 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.

2. 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.

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.

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.

AIRWORTHINESS ASSESSMENT OF THE EBEE UAS

BCG notes that the eBee UAS, including the aircraft, the flight software, and the post-processing software, is a mature and established system. The airworthiness of the eBee has been demonstrated on several different projects in the United States involving state/federal agencies or universities, including 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.

SenseFly has also obtained flight approvals for the eBee from the national civil aviation authority in many other 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)

OPERATING REQUIREMENTS

We propose to operate the aircraft with both a Pilot in Command (PIC) and a ground-based Visual Observer (VO) in accordance with FAA Policy N 8900.227 Section 14 "Operational Requirements for UAS" with the following additional restrictions:

- All operations will occur in Class G airspace at no more than 400' AGL
- Operations limited to Visual Flight Rules Meteorological Conditions (VMC) and daylight hours
- The aircraft will remain within Visual Line of Sight (VLOS) of both PIC and VO at all times
- VLOS guaranteed with a GPS geo-fence around operator of 0.5 miles
- Operations will be conducted over private, controlled-access property with the permission of the land owner (most surveys will take place over active mine sites that are characteristically large, removed from population centers, with controlled access)
- The aircraft will not be operated over urban or populated areas, at open-air assemblies of people, or at air shows
- The PIC will file a NOTAM for each operation
- The PIC must have completed the SenseFly training program for operation of the eBee
- 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
- 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 survey activities of BCG.

OPERATOR REQUIREMENTS

The aircraft will be operated by an individual who meets the following requirements:

- Has successfully passed a manufacturer's training program for the eBee; BCG requests the FAA treat the eBee training program as proprietary under 14 C.F.R. 11.35(b) and does not include this document in the public docket.
- Has a Private Pilot certificate.

The PIC and VO will meet the requirements outlined in FAA Policy N 8900.227 Section 16 Personnel Qualifications. The PIC will perform routine maintenance on the system and will complete a course of maintenance instruction as part of their initial training. Due to the simplicity of the system, we do not anticipate the need for a supplemental pilot.

CONCLUSION

Our mining clients operate in a very competitive financial global environment, and in hostile physical environments. Use of the eBee UAS is in the public interest because it allows these companies to reduce costs and remain competitive. It also supplants aircraft of significantly greater proportions carrying crew and flammable fuel, as well as conventional survey crews that require personnel to work in difficult and unsafe terrain. The eBee UAS makes not only the NAS safer, it makes BCG employees on the ground safer.

We submit that the combination of the aircraft's light weight, historically demonstrated flight performance, fully qualified flight crew and strict operation under the guidelines established in 8900.227, the FAA can have confidence that the operation will have an equivalent or greater level of safety of manned aircraft performing the same mission.

Sincerely,

Bowman Consulting

Reed Larson, PE
Vice President of Mining Services

Attachment: Exemption Requests

Transmitted separately: eBee User Manual
eBee Maintenance Manual
eBee Training Program
eBee Justification of Airworthiness and Safety Assessment