



January 13, 2015

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

Filed at [www.regulations.gov](http://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