

Exemption No. 11136

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, DC 20591

In the matter of the petition of

**ADVANCED AVIATION
SOLUTIONS LLC**

for an exemption from part 21 and §§ 45.23, 45.29, 61.113, 61.133, 91.9, 91.109, 91.119, 91.121, 91.151(a), 91.203(a) and (b), and 91.401–91.417 of Title 14, Code of Federal Regulations

Regulatory Docket No. FAA–2014–0508

GRANT OF EXEMPTION

By letter dated July 23, 2014, which referenced supplemental proprietary information submitted to the FAA under separate cover, Mr. Bradley J. Ward, Vice President, Advanced Aviation Solutions LLC, 8111 North Five Mile Road, Spokane, Washington 99208, petitioned the Federal Aviation Administration (FAA) for an exemption from part 21 and §§ 45.23, 45.29, 61.113, 61.133, 91.9, 91.109, 91.119, 91.121, 91.151(a), 91.203(a) and (b), and 91.401–91.417 of Title 14, Code of Federal Regulations (14 CFR). Advanced Aviation Solutions LLC also petitioned for an exemption from FAA Notice 8900.227, Unmanned Aircraft Systems (UAS) Operational Approval, paragraphs 16c(4) and 16e(1). The proposed exemption would allow Advanced Aviation Solutions LLC to operate the *eBee Ag* UAS (hereinafter referred to as the *eBee Ag*) manufactured by senseFly Ltd of Switzerland, to conduct photogrammetry and crop scouting in order to perform precision agriculture.

The petitioner requests relief from the following regulations:

Part 21, Certification Procedures for Products and Parts, prescribes, in pertinent part, the procedural requirements for issuing and changing design approvals, production approvals, airworthiness certificates, and airworthiness approvals.

Section 45.23 prescribes in paragraph (a) that each operator of an aircraft must display on that aircraft marks consisting of the Roman capital letter “N” (denoting United States registration) followed by the registration number of the aircraft. It then prescribes in paragraph (b) that when marks include only the Roman capital letter “N” and the registration

number is displayed on limited, restricted, or light-sport category aircraft or experimental or provisionally certificated aircraft, the operator must also display on that aircraft near each entrance to the cabin, cockpit, or pilot station, in letters not less than 2 inches nor more than 6 inches high, the words “limited,” “restricted,” “light-sport,” “experimental,” or “provisional,” as applicable.

Section 45.29(b)(iii) prescribes, in pertinent part, that marks at least 3 inches high may be displayed on an aircraft for which the FAA has issued an experimental certificate under §§ 21.191(d), 21.191(g), or 21.191(i) of this chapter to operate as an exhibition aircraft, an amateur-built aircraft, or a light-sport aircraft when the maximum cruising speed of the aircraft does not exceed 180 knots calibrated airspeed.

Section 61.113(a) and (b) prescribes, in pertinent part, that—

- (a) No person who holds a private pilot certificate may act as a pilot in command (PIC) of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as PIC of an aircraft.
- (b) a private pilot may, for compensation or hire, 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; and
 - (2) The aircraft does not carry passengers or property for compensation or hire.

Section 61.133(a) prescribes, in pertinent part, that a person who holds a commercial pilot certificate may act as pilot in command of an aircraft: (i) Carrying persons or property for compensation or hire, provided the person is qualified in accordance with this part and with the applicable parts of this chapter that apply to the operation; and (ii) For compensation or hire, provided the person is qualified in accordance with this part and with the applicable parts of this chapter that apply to the operation.

Section 91.9(b)(2) prescribes, in pertinent part, that no person may operate a U.S.-registered civil aircraft unless there is available in the aircraft a current approved Airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof.

Section 91.109(a) prescribes, in pertinent part, that no person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls.

Section 91.119 prescribes that, except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

- (a) *Anywhere.* An altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.

- (b) *Over congested areas.* Over any congested area of a city, town, or settlement, or over any open air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.
- (c) *Over other than congested areas.* An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.
- (d) *Helicopters, powered parachutes, and weight-shift-control aircraft.* If the operation is conducted without hazard to persons or property on the surface—
 - (1) A helicopter may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section, provided each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA; and
 - (2) A powered parachute or weight-shift-control aircraft may be operated at less than the minimums prescribed in paragraph (c) of this section.

Section 91.121 prescribes, in pertinent part, that each person operating an aircraft shall maintain the cruising altitude by reference to an altimeter that is set when operating below 18,000 feet mean sea level (MSL) to the elevation of the departure airport or an appropriate altimeter setting available before departure.

Section 91.151(a) prescribes that no person may begin a flight in an airplane under visual flight rules (VFR) conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed, (1) *during the day, to fly after that for at least 30 minutes* [emphasis added].

Section 91.203(a) prescribes, in pertinent part, that no person may operate a civil aircraft unless it has within it (1) an appropriate and current airworthiness certificate; and (2) an effective U.S. registration certificate issued to its owner or, for operation within the United States, the second copy of the Aircraft registration Application as provided for in § 47.31(c).

Section 91.203(b) prescribes, in pertinent part, that no person may operate a civil aircraft unless the airworthiness certificate 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.

Section 91.405(a) requires, in pertinent part, that an aircraft operator or owner shall have that aircraft inspected as prescribed in subpart E of the same part and shall, between required inspections, except as provided in paragraph (c) of the same section, have discrepancies repaired as prescribed in part 43 of the chapter.

Section 91.407(a)(1) prohibits, in pertinent part, any person from operating an aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless it has been approved for return to service by a person authorized under § 43.7 of the same chapter.

Section 91.409(a)(2) prescribes, in pertinent part, that no person may operate an aircraft unless, within the preceding 12 calendar months, it has had an inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.

Section 91.417(a) and (b) prescribes, in pertinent part, that—

- (a) Each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:
 - (1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—
 - (i) A description (or reference to data acceptable to the Administrator) of the work performed; and
 - (ii) The date of completion of the work performed; and
 - (iii) The signature, and certificate number of the person approving the aircraft for return to service.
 - (2) Records containing the following information:
 - (i) The total time in service of the airframe, each engine, each propeller, and each rotor.
 - (ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.
 - (iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.
 - (iv) The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained.
 - (v) The current status of applicable airworthiness directives (AD) and safety directives including, for each, the method of compliance, the AD or safety directive number and revision date. If the AD or safety directive

involves recurring action, the time and date when the next action is required.

(vi) Copies of the forms prescribed by § 43.9(d) of this chapter for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances.

(b) The owner or operator shall retain the following records for the periods prescribed:

- (1) The records specified in paragraph (a)(1) of this section shall be retained until the work is repeated or superseded by other work or for 1 year after the work is performed.
- (2) The records specified in paragraph (a)(2) of this section shall be retained and transferred with the aircraft at the time the aircraft is sold.
- (3) A list of defects furnished to a registered owner or operator under § 43.11 of this chapter shall be retained until the defects are repaired and the aircraft is approved for return to service.

FAA Notice 8900.227, paragraph 16.c.(4), PIC Medical, states, in pertinent part, that the PIC must maintain, at a minimum, a valid FAA second-class medical certificate issued under 14 CFR part 67, Medical Standards and Certification, or the FAA-recognized equivalent.

Paragraph 16.e.(1), Medical, states, in pertinent part, that all observers must have a valid FAA second-class medical certificate issued under part 67; an FAA-recognized equivalent is an acceptable means of demonstrating compliance with this requirement.

The FAA notes that the notice referenced above is now incorporated into FAA Order 8900.1, vol. 16, ch. 4., sec. 1.

The petitioner supports its request with the following information:

The petitioner has provided the following information – contained in its petition and proprietary supporting documentation: 1) Justification of airworthiness and safety assessment, 2) Inspection and maintenance requirements, 3) eBee senseFly User Manual, 4) eBee Training documentation, and 5) Aviation Experience – in support of its exemption request. Documents 1-4 above are hereinafter collectively referred to as the operating documents.

The FAA has organized the petitioner's information into four sections: (1) the unmanned aircraft system (UAS), (2) the UAS Pilot in Command (PIC), (3) the UAS operating parameters, and (4) the public interest.

Unmanned Aircraft System (UAS)

The petitioner states it plans to operate a UAS, the eBee Ag system carrying a geo-referenced still camera to conduct photogrammetry and crop scouting in order to perform precision agriculture. The petitioner explains the eBee Ag system consists of a lightweight (1.5 pound) battery powered aircraft, a personal computer-based ground control station, and associated communications equipment. The eBee Ag is a fixed-wing aircraft with a wingspan of about 3 feet and 2 feet in overall length which can operate at a maximum speed of about 50 knots.

The petitioner states the eBee Ag normally operates in an autonomous mode. Also, the PIC can modify the flight plan of the eBee at any time, using the flight management interface or by manual take-over via a regular RC remote controller. In autonomous mode, the operator can instruct the eBee Ag to hold (loiter) at its current position, return to the Home waypoint, initiate the planned landing procedure and immediately land in a spiral approach at the current location.

Regarding airworthiness certification, the petitioner requests an experimental airworthiness certificate be issued for the eBee Ag under the provisions of § 21.191(a) and (b). The petitioner states because an experimental certificate can be used for commercial purposes such as market surveys, sales demonstrations, and customer crew training; it believes an experimental certificate would permit this commercial purpose. The petitioner further states if an experimental airworthiness certificate is not appropriate, it requests an exemption from part 21, subpart H because the eBee Ag will be at least as safe, if not safer, than a conventionally certificated aircraft performing the same mission. The petitioner notes the eBee Ag: (1) will not carry persons, property, or fuel, (2) will only fly under strict operational requirements, (3) will weigh only 1.5 pounds, and (4) is constructed primarily out of foam.

Regarding civil aircraft certification required under § 91.203(a) and (b), the petitioner asserts the eBee Ag at 1.5 pounds is too small to carry documentation, does not have an entrance, and is not capable of carrying passengers or crew. The petitioner proposes to achieve an equivalent level of safety and meet the intent of § 91.203 by co-locating documents deemed appropriate for this aircraft by the FAA with the crew at the ground control station and available for inspection upon request. To identify the aircraft, the petitioner proposes that the information found on airworthiness and registration certificates be permanently affixed to the aircraft via placard.

The petitioner requests an exemption from §§ 45.23 and 45.29 because the 1.5 pound eBee Ag does not have an entrance in which the word "EXPERIMENTAL" can be placed and may not have a registration number assigned to it by the FAA. The petitioner proposes to achieve an equivalent level of safety by including the word "EXPERIMENTAL" on the top of the aircraft, where people in the vicinity of the aircraft will be able to see the designation. Additionally, the petitioner notes the previously proposed permanent placard regarding § 91.203 will provide the aircraft's registration information should it be found on the ground. The petitioner adds it will display at the ground station a high contrast flag or

banner that contains the words “Unmanned Aircraft Ground Station” in letters 3 inches high or greater.

Regarding keeping an approved civil aircraft flight manual aboard the UAS, the petitioner states it may need an exemption from § 91.9 because the aircraft is too small to carry documentation and that documentation would not be available to the crew. The petitioner proposes to obtain an equivalent level of safety by mandating that a current, approved Airplane Flight Manual be available to the crew at the ground station anytime the aircraft is in flight or preparing for flight.

Regarding the requirements for fully functioning dual flight controls aboard the aircraft, the petitioner notes the eBee Ag ground control station is based on a small hand-held computer; while it does not offer a second set of “controls,” both the student and instructor can and will operate the single set of controls simultaneously, which the petitioner asserts will meet the intent of § 91.109 and provide an equivalent level of safety.

The petitioner requests an exemption from the maintenance, preventative maintenance, and alterations requirements in part 91, Subpart E (§§ 91.401 through 91.417). The petitioner proposes that the PIC perform maintenance and inspection of the aircraft and be authorized to approve the aircraft for return to service. The petitioner explains as provided in the supplemental, proprietary maintenance procedures submitted to the FAA under separate cover to its petition, the PIC will ensure that the aircraft is in an airworthy condition prior to flight and conduct detailed inspections after every 10 hours. The petitioner states maintenance performed by the PIC is limited to repairing small cracks, replacing a propeller, and updating software and firmware; all other maintenance will be performed by the manufacturer. The PIC will document work performed in accordance with § 91.417. The petitioner asserts that because of the size, construction, and simplicity of the aircraft, the PIC can ensure an equivalent level of safety.

UAS Pilot in Command (PIC)

The petitioner states the aircraft will be operated in the field with both a PIC and a ground-based Visual Observer (VO) in accordance with FAA Policy N 8900.227.

Regarding PIC private pilot privileges and limitations and commercial pilot privileges and limitations, the petitioner states its proposed operations meet the requirements of N 8900.227 paragraph 16.c.(2)(c), operations without a pilot certificate, in which the PIC is required to complete FAA private pilot ground instruction and pass the FAA private pilot written examination. According to the petitioner, because there are currently no means available for the pilot of a UAS to gain the experience in an equivalent category and class in order to apply for a commercial pilot certificate, it would generate an equivalent level of safety by requiring its pilots to complete, at a minimum, the FAA commercial pilot ground instruction and pass the FAA commercial pilot written examination in addition to completing the private pilot requirements. The petitioner asserts because the eBee Ag cannot carry passengers or property, its UAS pilots would meet the intent of § 61.113(b) even though its request for exemption is to conduct a business.

Regarding medical requirements for the PIC and observer, the petitioner seeks an exemption from N 8900.227 paragraphs 16.c.(4) and 16.e.(1). The petitioner asserts the policy requiring the crew to meet the same medical requirements as a commercial pilot, carrying passengers in a large aircraft, is an unnecessary burden. The petitioner proposes the minimum medical requirements be vision corrected to 20/20 and a valid, State-issued driver's license. The petitioner notes because of the aircraft's size and weight, the greatest hazard of its proposed operation will be driving to the launch site. The petitioner adds that should the PIC and VO become medically incapacitated, the eBee Ag will recover autonomously to the landing location designated before launch without crew intervention.

UAS Operating Parameters

The petitioner states the aircraft will be operated with both a PIC and a ground-based VO in accordance with FAA Policy N 8900.227 Section 14, Operational Requirements for UAS. The petitioner adds some restrictions to N 8900.227 to include that all operations will occur in class G airspace at no more than 400 feet above ground level (AGL); operations will be conducted over private property with the permission of the land owner; and all required permits will be obtained from state and local government before operation. The petitioner notes the PIC will file a Notice to Airmen (NOTAM) providing radial/distance measuring equipment, radius, and a date/time group for each operation.

The petitioner also states the aircraft will not be operated (1) over urban or populated areas; (2) at air shows or over an open-air assembly of people; (3) over heavily trafficked roads; or (4) within 5 nautical miles of an airport or heliport. The petitioner notes operations will be limited to day, visual meteorological conditions and the aircraft will remain within visual line of sight at no greater than 1/2 nautical mile of the PIC at all times. In addition, while the aircraft is airborne, the VO will be positioned within voice distance to the PIC.

With respect to operating altitudes, the petitioner requests an exemption from the minimum safe altitude requirements in § 91.119. The petitioner notes the regulation provides that over sparsely populated areas the aircraft cannot be operated closer than 500 feet to any person, vessel, vehicle, or structure. The petitioner maintains because the aircraft will be operating at a maximum of 400 feet AGL, it cannot comply with this requirement. The petitioner proposes to provide an equivalent level of safety by only flying over private property with the permission of the landowner. The petitioner states the landowner will be briefed on the expected route of flight and the associated risks to persons and property on the ground. The petitioner asserts that because of the small size of the eBee Ag, the hazard to persons, vessels, vehicles, and structures is not comparable to manned aircraft and should be considered in granting the exemption. The petitioner further states the aircraft will not be operated over congested areas nor over any open air assembly of persons. In addition, the petitioner explains 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. Regarding the fuel requirements in § 91.151, the petitioner states the eBee Ag is battery-operated and the maximum duration of flight from a single battery charge is 50 minutes. The petitioner explains the aircraft will never fly more than 1/2 nautical mile

from the point of intended landing and that a full battery charge at launch will ensure it meets the reserve energy requirements. The petitioner requests an exemption to the word “fuel” and asks for an equivalent interpretation with the word “energy.”

The petitioner requests an exemption regarding the altimeter settings in § 91.121 because the eBee Ag will fly below 400 feet AGL and will not need to maintain hemispherical cruising altitudes to de-conflict with other aircraft. The petitioner states AGL should be an appropriate altimeter measurement presented to the pilot, and it should be based on the barometric pressure at the point of launch. To provide an equivalent level of safety, the petitioner explains the UAS’ AGL altimeter will be set to zero on the ground before every flight. The petitioner asserts that because the aircraft will fly no more than 50 minutes, even rapid changes in barometric pressure will have limited effect on the safety of the flight.

Public Interest

The petitioner states the eBee Ag carries an onboard geo-referenced still camera that provides high-resolution data to direct variable seeding rates as well as the precise application of fertilizer and chemicals, reducing their use. According to the petitioner, this data helps farmers maximize yields while reducing costs and impacts to the environment. The petitioner concludes that by granting an exemption, the FAA will create benefits to both agriculture and the environment, which are ultimately in the public interest.

In addition, the petitioner explains its intent to hire and train military veterans with experience operating small UAS, some of whom have disabilities. The petitioner notes despite any disabilities the veterans may have, they will provide invaluable operational experience that will enhance the safety of its operations. The petitioner states this exemption request is in the public interest by providing aviation-related jobs to those that would not otherwise be medically qualified without introducing additional risk.

Discussion of Public Comments:

A summary of the petition was published in the Federal Register on August 19, 2014 (79 FR 49145). The FAA received three comments regarding the notice of petition for exemption. One commenter supported Advanced Aviation Solutions LLC’s petition and two opposed it.

In support of Advanced Aviation Solution LLC’s petition, the Small UAV Coalition (hereafter the Coalition) urged the FAA to adopt an evaluation framework for UAS operations under section 333 of Pub. L. 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 (hereinafter referred to as UAS) based on commercial and noncommercial operations. The Coalition suggested FAA safety regulations be proportionate to the risks posed by the particular proposed UAS operations by distinguishing between UAS. The petitioner’s UAS pose considerably less safety risk than larger UAS used for defense and aerospace purposes. 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 FAA's evaluation of the potential risk posed by the proposed operations is contained in the analysis below.

The Coalition noted the FAA is to consider the seven factors¹ in section 333 as a minimum. The Coalition states the petition shows the FAA should consider factors other than those specified in section 333, such as location, altitude of its UAS, and pilot training and experience. 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. Based on the petitioner's plan to use a small unmanned aircraft (UA) weighing less than 2 pounds and the altitude and area in which its small UAs will be operated (on private property with the consent of property owners), the Coalition concluded petitioner's UAS operations will pose no safety risk to other aircraft, national security, or persons on the ground. The FAA's assessment of these factors is addressed in the analysis below.

The Air Line Pilots Association, International (ALPA) and the National Agricultural Aviation Association (NAAA) submitted comments opposed to a grant of exemption.

ALPA reviewed the anticipated operations expected to occur below 400 feet above the surface in class G airspace and stated the petitioner's operations would put its UAS at the same altitude as other aircraft in the National Airspace System (NAS) with only geographic separation to mitigate the risk of collision. ALPA further noted the aircraft "may not have a barometric altimeter" as required by § 91.121, so the ability to accurately maintain altitude must be addressed.

ALPA asserted that processes or mitigations, such as redundant control capability, fail-safe systems, and backups, and specific, validated procedures for system and equipment failures must be in place to ensure the aircraft and its control system(s) operate to the same level of safety as other aircraft operated commercially in the NAS. NAAA stated commercial UAS should have to receive airworthiness certification by the FAA to ensure they can safely operate in the NAS without posing a hazard to persons or property. As discussed in the analysis of the petition below, the Secretary of Transportation has determined that an airworthiness certificate is not required and the FAA has established conditions and limitations for the operator to mitigate the risk associated with operating aircraft that do not hold an airworthiness certification.

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 Coalition noted the eBee Ag has an override capability that allows the operator to operate the UAS manually at any time during the flight, should it

¹ Section 333(b) of P.L. 112-95 states: "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; ..."

be necessary to respond to emergent circumstances, with Go to Home, Go Land, and Hold and Resume the Mission commands.

The FAA agrees with ALPA and carefully examined the proposed operation to ensure that the vehicle design and the petitioner's supporting documentation addressed potential hazards related to C2 failure. The FAA finds that the UAS to be operated by the petitioner has sufficient design features to address these hazards. Further detail is contained in the analysis of the UAS below.

ALPA noted the petitioner is requesting an exemption from FAA Policy N 8900.227, paragraph 16.c.(4) and paragraph 16.e.(1). ALPA noted that although the petitioner claims the operators of the aircraft and observers will be required to have 20/20 vision, there is no assurance that this standard will be consistently met without an FAA medical certificate. ALPA asserted a current second-class FAA medical certificate should be required for a UAS pilot operating an aircraft for compensation or hire commercial operations as is required in the NAS.

ALPA noted the proposed operations will be for "compensation or hire," and ALPA believed 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 intended to be used. NAAA also favored UAS operators holding a commercial pilot certificate and second-class medical certificate to conduct commercial operations.

ALPA expressed concern that the petitioner did not specify requirements for flight instructors. Therefore, there is no indication what the qualifications will be of the persons providing flight instruction.

ALPA expressed concern that because the waiver request is not for a single specific operation but rather for all operations of the same general type, the FAA's oversight task is considerably increased. According to ALPA, specific details of every operation must be communicated to the FAA for approval to ensure that operation- and location-specific mitigations result in the same current level of safety being maintained.

ALPA noted the petitioner lists appendices A through G, as attached to the petition; however, only appendix A is available to review.

Regarding use of the NAS, ALPA noted there must be means to ensure the UA remains within the defined airspace and to ensure the hazard of other aircraft intruding on the operation is mitigated. ALPA stated given the absence of an onboard pilot, the means to meet the requirements to "see and avoid" must be specified. The FAA notes these concerns; additional detail is provided in the analysis of the UAS below.

NAAA explained it represents the interests of small business owners and pilots licensed as commercial applicators. NAAA noted its members operate in low-level airspace, and clear low-level airspace is vital to the safety of these operators. NAAA stated that seeing and

avoiding other aircraft and hazardous obstructions is the backbone of agricultural safety, and agricultural pilots depend on pilots of other aircraft to perform their see-and-avoid functions to prevent collisions. NAAA believed UA operations at low altitudes will increase the potential of collision hazards with agricultural aircraft.

NAAA believed it is vital that commercial aircraft, manned and unmanned, have received airworthiness certification by the FAA to ensure they can safely operate in the NAS without posing a hazard to persons or property. NAAA believed UAS should have equipage such as Automatic Dependent Surveillance–Broadcast Out, strobe lighting, and marking to ensure the aircraft is visible to law enforcement, and the public, and manned and unmanned aircraft. NAAA proposed sUAS comply with 13 measures similar to those presented by the North Dakota Agricultural Aviation Association to the North Dakota Department of Commerce, the organization awarded the North Dakota UAS test site.

Concerns raised in this comment section are addressed in the FAA’s analysis below and where necessary appropriate risk mitigations are implemented through the conditions and limitations on the operations.

The FAA’s analysis is as follows:

UAS

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts*. In accordance with the statutory criteria provided in Section 333 of P.L. 112-95 in reference to 49 USC § 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.

Manned aircraft conducting aerial surveying operations can weigh 5,000 to 7,000 lbs. or more, are operated by an onboard pilot and may carry other onboard crewmembers, as well as carry 100-200 gallons or more of fuel. The petitioner’s UA weighs approximately 1.5 lbs. The pilot and crew will be remotely located from the aircraft. The limited weight and construction reduces the potential for harm to persons or damage to property in the event of an incident or accident. 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.

Manned aircraft are at risk of fuel spillage and fire in the event of an incident or accident. The UA carries no fuel and therefore the risk of fire following an incident or accident due to fuel spillage is eliminated.

The petitioner’s UAS has the capability to operate safely after experiencing certain in-flight contingencies or failures and uses an auto-pilot system to maintain UAS stability and control. The UAS is also able to respond to a loss of GPS or a lost-link event with pre-coordinated automated flight maneuvers. These safety features ensure that these operations

will not adversely impact safety compared to a manned aircraft performing a similar operation and address ALPA's comments on mitigating risk of command and control link failures.

Regarding the petitioner's requested relief from 14 CFR 45.23 *Display of marks*, the petitioner can comply with § 45.23(a). Regarding § 45.23(b), the petitioner requests this relief under the assumption that marking with the word "experimental" will be required as a condition of a grant of exemption. However, this marking is reserved for aircraft that are issued experimental certificates under 14 CFR 21.191. The petitioner's UAS will not be certificated under § 21.191, and therefore the "experimental" marking is not required. Since the petitioner's UAS will not be certificated under § 21.191, a grant of exemption for § 45.23(b) is not necessary.

The petitioner's UA 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 per § 45.29(f). Therefore a grant of exemption for § 45.29 is not necessary.

Regarding the petitioner's requested relief from 14 CFR 91 subpart H, the relevant parts of subpart H include: 14 CFR §§ 91.405(a) *Maintenance required*, 91.407(a)(1) *Operation after maintenance, preventive maintenance, rebuilding, or alteration*, 91.409(a)(1) and (2) *Inspections*, and 91.417(a) and (b) *Maintenance records*.

The FAA has carefully evaluated the petitioner's request and determined that cause for granting the exemption is warranted. The FAA notes that the petitioner's operating documents contain sufficient information for the preparation and care of the UAS equipment. The FAA finds that adherence to these documents, as required by the conditions and limitations below, is sufficient to ensure that safety is not adversely affected. In accordance with the petitioner's UAS maintenance, inspection, and recordkeeping requirements, the FAA finds that exemption from 14 CFR 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b) is warranted subject to the conditions and limitations below.

Pilot In Command of the UAS

Regarding the petitioner's requested relief from 14 CFR 61.113, *Private pilot privileges and limitations*, and 14 CFR 61.133 *Commercial pilot privileges and limitations*, the petitioner requested regulatory relief to operate its UAS without an FAA-certificated pilot. In support of its request, the petitioner states that its "proposed operations meet the requirements of 8900.227 para 16(c)(2)(c) *Operations without a pilot certificate* in which the PIC is required to complete FAA private pilot ground instruction and pass the FAA Private Pilot written examination." The FAA notes that the notice referenced above is now incorporated into FAA Order 8900.1, vol. 16, ch. 4, sec. 1.. The petitioner would also require pilots to complete FAA commercial pilot ground instruction and pass the FAA Commercial Pilot written examination.

Regarding the proposal to operate without a pilot certificate, the FAA does not possess the authority to exempt the petitioner from the statutory requirement to hold an airman certificate as prescribed in 49 USC § 44711.² Although Section 333 provides limited statutory flexibility relative to 49 USC § 44704 for the purposes of airworthiness certification, it does not provide flexibility relative to other sections of Title 49.

Unlike operations pursuant to a public Certificate of Waiver or Authorization (COA), the FAA is requiring a pilot certificate for UAS operations for two reasons, the first of which is to satisfy the statutory requirements as stated above. The second is because pilots holding a private pilot certificate are subject to the security screening by the Department of Homeland Security that certificated airmen undergo. As previously determined by the Secretary, the requirement to have an airman certificate ameliorates security concerns over civil UAS operations conducted in accordance with Section 333.

Given these grounds, the FAA must determine the appropriate level of pilot certification for the petitioner's proposed operation.

Under current regulations, civil operations for compensation or hire require a PIC holding a commercial pilot certificate per 14 CFR part 61. Based on the private pilot limitations in accordance with the pertinent parts of 14 CFR 61.113(a) and (b), a pilot holding a private pilot certificate cannot act as a PIC of an aircraft for compensation or hire unless the flight is only incidental to a business or employment. However, in Grant of Exemption No. 11062 to *Astraeus Aerial (Astraeus)* (*see* Docket FAA-2014-0352), the FAA determined that a PIC with a private pilot certificate operating the *Astraeus* UAS would not adversely affect operations in the NAS or present a hazard to persons or property on the ground.

As discussed above, Advanced Aviation Solution's petition received two comments registering concern about pilot certification. ALPA stated its opposition to the proposed operation by a non-certificated pilot without a required medical certificate. ALPA believes that the operation should be conducted by a PIC holding a current FAA commercial pilot certificate with an appropriate category and class rating for the type of aircraft being flown and a current second-class airman medical certificate. NAAA stated that the UAS pilot should be a commercial pilot or have similar training and can demonstrate knowledge of aviation safety and communication procedures.

The FAA has analyzed the petitioner's proposed operation and has determined that it does not differ significantly from the situation described in Grant of Exemption No. 11062 (*Astraeus*). The petitioner plans to operate over private property with controlled access in the NAS. Given: 1) the similar nature of the petitioner's proposed operating environment to that of *Astraeus*, 2) the parallel nature of private pilot aeronautical knowledge requirements to those of commercial requirements, and 3) the airmanship skills necessary to operate the UAS, the FAA finds that the additional manned airmanship experience of a commercially

² 49 USC § 44711 prohibits a person from serving "in any capacity as an airman with respect to a civil aircraft, aircraft engine, propeller, or appliance used, or intended for use, in air commerce...without an airman certificate authorizing the airman to serve in the capacity for which the certificate was issued".

certificated pilot would not correlate to the airmanship skills necessary for the petitioner's operations. Therefore, the FAA finds that a PIC holding a private pilot certificate and a third-class airman medical certificate is appropriate for the proposed operations.

With regard to the airmanship skills necessary to operate the UAS (item #3 stated above), the petitioner has proposed a training program. The conditions and limitations below stipulate that the petitioner may not permit any PIC to operate the UAS unless that PIC has demonstrated through the petitioner's training program that the PIC is able 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.

In conclusion, the FAA finds that a PIC holding a private pilot certificate and a third-class airman medical certificate, and who has completed the petitioner's UAS training, can conduct the proposed UAS operations without adversely affecting the safety of the NAS and persons or property on the ground. Upon consideration of the overall safety case presented by the petitioner and the concerns of the commenters, the FAA finds that granting the requested relief from 14 CFR § 61.113(a) and (b), is warranted.

The petitioner has also indicated it will supplement its proposed operation(s) with a visual observer (VO). The FAA also received a comment regarding the appropriate level of medical certification for the VO. In Grant of Exemption No. 11062, the FAA agreed with the petitioner's proposed use of a VO and required a VO to be used in all UAS operations; however, the FAA considers the PIC's ability to maintain visual line of sight (VLOS) with the UAS to be of primary significance and thus the medical certification requirement falls on the PIC. In accordance with regulations, a third-class airman medical certificate is the appropriate level of certificate to exercise the privileges of a private pilot certificate. There are no regulatory requirements for visual observer medical certificates. Although a medical certificate is not required for a VO, the UA must never be operated beyond the actual visual capabilities of the VO, and the VO and PIC must have the ability to maintain VLOS with the UA at all times. It is the responsibility of the PIC to be aware of the VO's visual limitations and limit operations of the UA to distances within the visual capabilities of both the PIC and VO. Moreover, the VO will not be operating the aircraft. Therefore, as in Grant of Exemption No. 11062, the FAA does not consider a medical certificate necessary for the VO.

Operating parameters of the UAS

Although the petitioner did not request relief from 14 CFR 91.7(a) *Civil aircraft airworthiness*, the FAA finds that relief from § 91.7(a) is necessary. While the petitioner's UAS will not require an airworthiness certificate in accordance with 14 CFR part 21, Subpart H, the FAA considers the petitioner's compliance with its operating documents to be a sufficient means for determining an airworthy condition. Therefore, relief from § 91.7(a) is granted. The petitioner is still required to ensure that its aircraft is in an airworthy condition – based on compliance with the operating documents prior to every flight, and as stated in the conditions and limitations below.

Additionally, in accordance with 14 CFR 91.7(b), the PIC of the UAS is responsible for determining whether the aircraft is in a condition for safe flight. The FAA finds that the PIC can comply with this requirement, therefore relief from § 91.7(b) is not necessary.

Regarding the petitioner's requested relief from 14 CFR 91.9 *Civil aircraft flight manual, marking, and placard requirements* and 14 CFR 91.203(a) and (b) *Civil aircraft: Certifications required*, the FAA has previously determined 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.

Regarding the petitioner's requested relief from 14 CFR 91.109 *Flight instruction; Simulated instrument flight and certain flight tests*, the petitioner did not describe training scenarios in which a dual set of controls would be utilized or required, i.e. dual flight instruction, provided by a flight instructor or other company-designated individual, that would require that individual to have fully functioning dual controls. Rather, the petitioner intends to accomplish training through the procedures referenced in the operating documents. Furthermore, the FAA is requiring that the petitioner's PICs possess at least a private pilot's certificate. Also, this exemption will require that training operations only be conducted during dedicated training sessions. The FAA finds safety will not be adversely impacted if the petitioner follows the training outlined in the operating documents. As such, the FAA finds that the petitioner can conduct its operations without the requested relief from § 91.109.

Regarding the petitioner's requested relief from 14 CFR 91.119 *Minimum safe altitudes*. relief from § 91.119(a), which requires operating at an altitude that allows a safe emergency landing if a power unit fails, is unprecedented and unwarranted. . Relief from § 91.119(b), operation over congested areas, is not granted, because, as discussed below, operations over congested areas will not be permitted under this exemption.

Relief from § 91.119(c) is necessary because the aircraft will be operated at altitudes below 400 feet AGL. Section 91.119(c) states that no person may operate an aircraft below the following altitudes: *over other than congested areas*, an altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure. The petitioner states that it will operate pursuant to the following, self-imposed restrictions related to § 91.119:

- Flights will only occur over private property with the permission of the landowner.
- The landowner will be briefed of the expected route of flight and the associated risks to persons and property on the ground.
- The UA will not be operated over congested areas or over any open air assembly of persons.
- The UA 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.

The petitioner proposes to avoid congested areas and operations over open air assemblies of persons. Accordingly operations over congested or densely populated areas are prohibited as stated in the conditions and limitations below.

The petitioner did not describe stand-off distances from persons, vessels, vehicles and structures. Section 91.119(c) requires that aircraft operate no closer than 500 feet to these persons or objects. As discussed in Exemption No. 11109 to Clayco, Inc. (*see* Docket No. FAA-2014-0507), operations conducted closer than 500 feet to the ground may require that the UA be operated closer than 500 feet to essential persons, or objects that would not be possible without additional relief. Therefore, the FAA is requiring that prior to conducting UAS operations, all persons not essential to flight operations (nonparticipating persons) must remain at appropriate distances. In open areas this requires the UA to remain 500 feet from all persons other than essential flight personnel (i.e. PIC, VO, operator trainees or essential persons). The FAA has also considered that the UA will weigh about 1.5 pounds. If barriers or structures are present that can sufficiently protect nonparticipating persons from the UA or debris in the event of an accident, then the UA may operate closer than 500 feet to persons afforded such protection. The operator must also 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. When considering how to immediately cease operations, the primary concern is the safety of those nonparticipating persons. In addition, the FAA finds that operations may be conducted closer than 500 feet to vessels, vehicles and structures when the land owner/controller grants such permission and the PIC makes a safety assessment of the risk of operating closer to those objects and determines that it does not present an undue hazard

Thus, the FAA finds that relief from § 91.119(c) is warranted provided adherence to the procedures in the operating documents and the FAA's additional conditions and limitations outlined below. Relief from § 91.119(a) is unwarranted as the FAA expects the petitioner to be able to perform an emergency landing without undue hazard to persons or property on the surface. Relief from §§ 91.119(b) and 91.119(d) are not applicable.

Regarding the petitioner's requested relief from 14 CFR § 91.121 *Altimeter Settings*, the petitioner has a barometric altimeter, and they propose to set that altimeter to zero rather than local barometric pressure or field altitude. Considering the limited altitude of the proposed operations, the FAA has determined that good cause exists for granting the requested relief to 14 CFR § 91.121.

Regarding the petitioner's requested relief from § 91.151(a) *Fuel requirements for flight in VFR conditions*, prior relief has been granted for manned aircraft to operate at less than the prescribed minimums, including Exemption Nos. 2689, 5745, and 10650. In addition, similar UAS-specific relief has been granted in Exemption Nos. 8811, 10808, and 10673 for daytime, VFR conditions. The UAS provides battery power remaining in percent to the PIC. The UA batteries provide approximately 50 minutes of powered flight. Information provided in the operating documents discusses procedures regarding remaining battery power. Those documents contain a condition in which the PIC will initiate a landing procedure when battery remaining reaches 30%. Given the limitations on its proposed

operations and the location of those proposed operations, a reduced minimum power reserve for flight in daytime VFR conditions is reasonable. These factors provide the FAA with sufficient reason to grant the relief from 14 CFR 91.151(a) as requested in accordance with the conditions and limitations below, that prohibit the PIC from beginning a flight unless (considering wind and forecast weather conditions) there is enough power to fly to the first point of intended landing and, assuming normal cruising speed, land the UA with 30% battery power remaining.

Regarding an Air Traffic Organization (ATO) issued COA, the majority of current UAS operations occurring in the NAS are being coordinated through Air Traffic Control (ATC) by the issuance of a COA. This is an existing process that not only makes local ATC facilities aware of UAS operations, but also provides ATC the ability to consider airspace issues that are unique to UAS operations. The COA will require the operator to request a NOTAM, which is the mechanism for alerting other users of the NAS to the UAS activities being conducted. The conditions and limitations below prescribe the requirement for the operator to obtain an ATO-issued COA.

Public Interest

The FAA finds that a grant of exemption is in the public interest. The UA carries an onboard geo-referenced still camera that provides high-resolution data to direct variable seeding rates as well as the precise application of fertilizer and chemicals, reducing their use. According to the petitioner, this data helps farmers maximize yields while reducing costs and impacts to the environment, which is in the public interest. The enhanced safety achieved using a UA with the specifications described by the operator 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.

The table below summarizes the FAA's determinations regarding regulatory relief:

Relief considered (14 CFR)	FAA determination (14 CFR)
Part 21	Relief not necessary
45.23	Relief not necessary
45.29	Relief not necessary (not experimental certificated)
61.113	Paragraphs (a) and (b) granted with conditions and limitations
61.133	Relief not necessary
91.7	Paragraph (a) granted with conditions and limitations
91.9	Relief not necessary
91.109	Relief not necessary
91.119	Paragraph (c) granted with conditions and limitations
91.121	Granted with conditions and limitations

Relief considered (14 CFR)	FAA determination (14 CFR)
91.151	Paragraph (a)(1), day, granted with conditions and limitations
91.203(a) and (b)	Relief not necessary
91.405	Paragraph (a) granted with conditions and limitations
91.407(a)(1)	Paragraph (a)(1) granted with conditions and limitations
91.409(a)(1) and (2)	Paragraph (a)(1) and (2) granted with conditions and limitations
91.417(a) and (b)	Paragraph (a) and (b) granted with conditions and limitations

The FAA's 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, Advanced Aviation Solutions LLC is granted an exemption from 14 CFR 61.113(a) and (b), 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 Advanced Aviation Solutions LLC to operate UAS for the purpose of aerial imagery to support agriculture. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

Relative to this grant of exemption, Advanced Aviation Solutions LLC is hereafter referred to as the operator.

The following documents provided by the operator in its petition, 1) Justification of airworthiness and safety assessment, 2) Inspection and maintenance requirements, 3) eBee senseFly User Manual and 4) eBee Training documentation, are hereafter referred to as the operating documents.

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 following aircraft described in the operating documents which is a fixed-wing aircraft weighing approximately 1.5 pounds: senseFly eBee Ag (eBee Ag). Proposed operations of any other aircraft will require a new petition or a petition to amend this grant.
2. The UA may not be flown at an indicated airspeed exceeding 70 knots.

3. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL), as indicated by the procedures specified in the operating documents. All altitudes reported to ATC must be in feet AGL.
4. 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.
5. All operations must utilize a visual observer (VO). 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. 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 functions prescribed in the operating documents.
6. The operating documents and this grant of exemption must be maintained 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 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 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.
7. Prior to each flight the PIC must inspect the UAS to ensure it is in a condition for safe flight. 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. The Ground Control Station must be included in the preflight inspection. All maintenance and alterations must be properly documented in the aircraft records.
8. Any UAS 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. The PIC who conducts the functional test flight must make an entry in the aircraft records.
9. The pre-flight inspection section in the operating documents must account for all discrepancies, i.e. inoperable components, items, or equipment, not already covered in the relevant sections of the operating documents.

10. The operator must follow the UAS aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements.
11. The operator must carry out its maintenance, inspections, and record keeping requirements, in accordance with the operating documents. Maintenance, inspection, and alterations must be noted in the aircraft records, including total flight hours, description of work accomplished, and the signature of the PIC returning the UAS to service.
12. Each UAS operated under this exemption must comply with all manufacturer System and Safety Bulletins.
13. The PIC must make an entry in the aircraft record of the corrective action taken against discrepancies discovered between inspections.
14. The Pilot in Command (PIC) must possess at least a private pilot certificate and at least a current third-class medical certificate. The PIC must also meet the flight review requirements specified in 14 CFR 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.
15. The operator may not permit any PIC to operate unless that PIC has demonstrated through the operator's training that the PIC is able 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. A record of training must be documented and made available upon request by the Administrator. Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building), are permitted under the terms of this exemption. However, said training operations may only be conducted during dedicated training sessions.
16. 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.
17. All operations shall be conducted in Class G airspace.
18. The UA may not operate within 5 nautical miles of the airport reference point as denoted on a current FAA-published aeronautical chart.
19. 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.
20. If the UA loses communications or loses its GPS signal, it must return to a pre-determined location within the planned operating area and land or be recovered in accordance with the operating documents.

21. The PIC must abort the flight in the event of unpredicted obstacles or emergencies in accordance with the operating documents.
22. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough power to fly at normal cruising speed to the intended landing point and land the UA with 30% battery power remaining.
23. The operator must obtain an Air Traffic Organization (ATO) issued Certificate of Waiver or Authorization (COA) prior to conducting any operations under this grant of exemption. This COA will also require the operator to request a Notice to Airman (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to the operation.
24. 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.
25. Before conducting operations, the radio frequency spectrum used for operation and control of the UA must comply with the Federal Communications Commission (FCC) or other appropriate government oversight agency requirements.
26. The 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.
27. The UA must remain clear and yield the right of way to all other manned aviation operations and activities at all times.
28. The UAS may not be operated by the PIC from any moving device or vehicle.
29. The UA may not be operated over congested or densely populated areas.
30. 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 and/or;
 - b. the aircraft is operated near vessels, vehicles or structures where the land owner/controller has granted permission and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard, and

- c. operations nearer to the PIC, VO, operator trainees or essential persons do not present an undue hazard to those persons per § 91.119(a).
31. All operations shall be conducted over private or controlled-access property with permission from the land owner/controller or authorized representative. Permission from land owner/controller or authorized representative will be obtained for each flight to be conducted.
 32. 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.nts.gov.

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 January 31, 2017, unless sooner superseded or rescinded.

Issued in Washington, DC, on January 5, 2015.

/s/

John S. Duncan
Director, Flight Standards Service