

Exemption No. 11166

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

In the matter of the petition of

**PRAVIA, LLC**

for an exemption from part 21 subpart H (§§ 21.171–21.199) and §§ 45.23(b), 91.7(a), 91.9(b), 91.103, 91.109, 91.119, 91.121, 91.151(a), 91.203(a) and (b), and Part 91 Subpart E (91.401–91.417) of Title 14, Code of Federal Regulations

**Regulatory Docket No. FAA–2014–0790**

**GRANT OF EXEMPTION**

By letter dated September 30, 2014, which referenced supplemental proprietary information submitted to the FAA under separate cover, Mr. Tim Ray and Mr. Scott Brink, Managing Partners, Pravia, LLC, 555 Falcon Trail, Niceville, Florida 32578, petitioned the Federal Aviation Administration (FAA) for an exemption from part 21 subpart H (§§ 21.171–21.199) and §§ 45.23(b), 91.7(a), 91.9(b), 91.103, 91.109, 91.119, 91.121, 91.151(a), 91.203(a) and (b), and Subpart E (91.401–91.417) of Title 14, Code of Federal Regulations (14 CFR). The exemption would allow Pravia, LLC to operate the E384 Unmanned Aircraft System (UAS) (hereinafter referred to as the E384) for the purpose of providing high-resolution aerial imagery to a domestic agricultural seed company, for agricultural analysis including biomass estimation, yield monitoring, leaf area indexing, and overall crop health to help maximize crop yields.

**The petitioner requests relief from the following regulations:**

Part 21, subpart H (§§ 21.171-21.199), prescribes in pertinent part, the procedural requirements for issuing and changing design approvals, production approvals, airworthiness certificates, and airworthiness approvals.

Section 45.23(b) prescribes 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 91.7(a) prescribes that no person may operate a civil aircraft unless it is in an airworthy condition.

Section 91.9(b) 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 91.103 prescribes, in pertinent part, that each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight, to include—

- (a) For a flight under IFR or a flight not in the vicinity of an airport, weather reports and forecasts, fuel requirements, alternatives available if the planned flight cannot be completed, and any known traffic delays of which the pilot in command has been advised by ATC;
- (b) For any flight, runway lengths at airports of intended use, and the following takeoff and landing distance information:
  - (1) For civil aircraft for which an approved Airplane or Rotorcraft Flight Manual containing takeoff and landing distance data is required, the takeoff and landing distance data contained therein; and
  - (2) For civil aircraft other than those specified in paragraph (b)(1) of this section, other reliable information appropriate to the aircraft, relating to aircraft performance under expected values of airport elevation and runway slope, aircraft gross weight, and wind and temperature.

Section 91.109 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.

Part 91, Subpart E (§§ 91.401-91.417), prescribes, in pertinent part, rules governing the maintenance, preventive maintenance, and alterations of U.S.-registered civil aircraft operating within or outside of the United States.

**The petitioner supports its request with the following information:**

The petition and the following supporting documentation are hereinafter referred to as the operating documents:

- 1) E384 Operations Manual

- 2) E384 Maintenance Manual
- 3) Event 38 Training Syllabus
- 4) Domestic agricultural seed company site information

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 E384, which is manufactured by Event 38 of Akron, Ohio, and includes a lightweight battery-powered/operated aircraft, ground control station, and associated data link equipment. The E384 airframe is constructed of EPO foam with a carbon fiber tail and weighs 5.9 lbs., with a wingspan of 6.2 feet and total length of 4.3 feet. The E384 is powered by two lithium polymer batteries that drive an electric propeller. It is hand launched, has a maximum flight time of 100 minutes, and operates at a cruising speed of 27 mph. The ground control station consists of a Turnigy 9XR remote and PC computer which have a maximum data link range of 5.4 nautical miles (NM). If the E384 loses link with the ground control station or detects a low battery state at any time it will initiate a return-to-launch sequence.

Regarding airworthiness certification, the petitioner requests an exemption from part 21, subpart H, Airworthiness Certificates, (§§ 21.171-21.199). The petitioner states that an equal level of safety will be achieved with the operational limitations described in the petition. Specifically, all flights will occur within visual line of sight (VLOS) of the PIC and visual observer (VO), at an altitude of 400 feet above ground level (AGL) or less, only over designated agricultural plots. As a result of the operating limits proposed, combined with the E384's lightweight airframe and Pravia's pilot requirements, the petitioner states that the E384 can safely operate without creating a hazard to other aircraft or to persons or structures on the ground.

Regarding aircraft markings, the petitioner requests an exemption from § 45.23(b) because the E384 is unmanned and therefore does not have an entrance on which the required markings could be displayed. In addition, the petitioner 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" in the largest lettering possible on the top of the aircraft. The petitioner adds it will display at the ground control station a flag with the words "EXPERIMENTAL UAS" in 3-inch lettering. The petitioner adds that because the E384 would always be within VLOS of the PIC (positioned at the ground station) and would be flown at 400 feet AGL or lower, the markings on the airframe and the flag at the ground station would allow parties to be visually informed of the UAS's operating status.

Regarding civil aircraft certification required under § 91.7(a), the petitioner notes that it is already seeking exemption from airworthiness certification and, thus, that no FAA standard will exist for determining airworthiness. The petitioner states that it will achieve an equal

level of safety by following the pre-flight protocol for each flight, safety checks, and comprehensive maintenance procedures prescribed in the operating documents.

Regarding keeping an approved civil aircraft flight manual aboard the UAS, the petitioner states it may need an exemption from § 91.9(b), 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 current operating documents be available to the crew at the ground station anytime the aircraft is in flight or preparing for flight.

Regarding the requirements in § 91.109 for fully functioning dual flight controls aboard the aircraft, the petitioner notes the E384 ground control station is computer-based; while it does not offer a second set of “controls,” both the student and instructor can and will operate the single set of controls, which could be passed back and forth between the student and instructor.

Regarding the requirement in § 91.203 that all civil aircraft have “an appropriate and current airworthiness certificate” that must be “displayed at the cabin or cockpit entrance so that it is legible to passengers or crew[.]” the petitioner notes that it is already seeking an exemption from airworthiness certification requirements and therefore requires an exemption from this regulation as well. Moreover, due to its size and design, the E384 has no cabin or cockpit and therefore no ability to affix or carry certificate or registration documents. The petitioner proposes that an equivalent level of safety can be attained by keeping any FAA-required documents at the ground control station and by affixing a small placard to the E384 airframe with manufacture, registration, and contact information.

The petitioner requests an exemption from the maintenance, preventive 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 according to the operating documents, which are supplemental, proprietary operations and maintenance procedures submitted to the FAA under separate cover to its petition. The petitioner proposes that the PIC will ensure that the aircraft is in an airworthy condition prior to flight and approve its return to service. Additional maintenance will be performed by the manufacturer. The petitioner states “all maintenance performed on the E384 by the PIC and manufacturer is documented in accordance with 91.407 (a) (1).” Further, the petitioner states “that the records will include ‘a description of the work performed; and the date of completion of the work performed; and the signature...of the person approving the aircraft for return to service.’” (omission in original). The petitioner states “the PIC will authorize the E384 for return to service for all maintenance covered in the E384 Operations Manual and Maintenance Manual and the manufacturer will authorize the E384 for return to service for all maintenance that is outside the scope of these two documents.”

#### UAS Pilot in Command (PIC)

The petitioner states the aircraft will be operated over designated agricultural plots with both a PIC and a ground-based Safety Observer. The Safety Observer will be located next to the

PIC and will ensure the aircraft remains within VLOS of the PIC and Safety Observer. The petitioner states that all E384 operations will be conducted by commercially certified pilots who have completed the training in accordance with the operating documents. The petitioner suggests that by utilizing licensed commercial pilots as pilot in command, the proposed operations will not adversely affect safety because of the confined and controlled area of operations. The petitioner also stated that the PIC will have additional qualifications and training prior to operations conducted under this exemption. Additionally, anytime the PIC or Safety Observer spots a potential hazard, such as a manned aircraft within close proximity to the designated flight area, the PIC will immediately land the E384 and operations will only resume after the hazard is clear of the area.

### UAS Operating Parameters

The petitioner states the aircraft will be operated with both a PIC and a ground-based Safety Observer. The E384 is hand-launched on-site, requiring no runway for takeoff and landing and no transit to or from the site. Once airborne, the E384 will fly at an altitude of 400 feet AGL or less over the designated agricultural plot. Prior to flight, the PIC will set a designated flight area and flight parameters to ensure that the E384 will remain within the confines of the approved site and not exceed a maximum altitude of 400 feet AGL. If a critical issue is detected at any time, such as a low battery state or loss of data link, the E384 will immediately execute preprogrammed safety procedures. The petitioner states that the E384's small operational footprint and built-in safety protocol provide a much safer alternative for aerial imaging and would pose a minimal hazard to the NAS or public.

The petitioner states that the E384 will only operate over agricultural plots for the purpose of collecting aerial imagery. There are 10 sites over which the petitioner proposes the E384 will be flown. All sites are owned and operated by a domestic agricultural seed company which has already granted approval to the petitioner to conduct E384 flights. The petitioner notes that there are a few small office and maintenance buildings located among the agricultural plots and the petitioner will ensure all E384 operations avoid overflight of these structures. In addition, there are no commercial airports within 5 NM and no general aviation airports within 3 NM of any of the sites. The E384 will also operate at an altitude of 400 feet AGL, or less, and as a result will be laterally de-conflicted from manned aircraft operations. By operating at low altitudes over agricultural plots the petitioner asserts that the E384 will pose no threat to individuals or structures on the ground and will remain well clear of any and all air traffic. The petitioner's operational limitations require the PIC to file a Notice to Airmen (NOTAM) for E384 flights at each site, providing at a minimum radial/DME, radius, and a date/time group.

The petitioner indicates the E384 will be flown in accordance with day Visual Flight Rules (VFR) and only in Visual Meteorological Conditions (VMC) during daylight hours. The E384 will operate within 1 NM and VLOS of the PIC (and the Safety Observer positioned next to the PIC) at an altitude of 400 feet AGL or less. The Safety Observer will be responsible for ensuring that the E384 remains within VLOS at all times and will also assist in spotting potential hazards.

Regarding the requirement in § 91.103 that the PIC be familiar with specific information before each flight such as weather and fuel requirements, as well as information found within approved flight manuals relating to aircraft performance and take-off and landing distances, the petitioner notes that the E384 has no FAA-approved flight manual and that therefore the petitioner seeks exemption from this requirement. The petitioner proposes to attain an equivalent level of safety by following the operating documents, submitted to the FAA as an appendix under separate cover. According to the petitioner, the E384 Operations Manual contains information comparable to that found in FAA-approved flight manuals.

With respect to operating altitudes, the petitioner requests an exemption from the minimum safe altitude requirements in § 91.119. The petitioner notes § 91.119(c) 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 notes that the sole function of the E384 is to fly at low altitudes over agricultural plots, which the petitioner asserts can be categorized as “other than congested areas”. The petitioner states an equivalent level of safety will be maintained by operating the E384 only over designated domestic agricultural seed company sites, the details of which were provided in Appendix A to the petition. Additionally, the petitioner states that the E384’s small size and foam airframe is less hazardous to persons and structures on the ground than a manned fixed-wing aircraft performing the same service. The petitioner adds, moreover, that by operating at an altitude of 400 feet AGL or less the E384 will not be in conflict with manned aircraft that are subject to this minimum altitude regulation.

Regarding the altimeter settings requirements in § 91.121, the petitioner states that the E384 is not equipped with a programmable altimeter; rather, the E384 determines location and altitude using an onboard GPS. Moreover, because the E384 will be operating at or below 400 feet AGL, the petitioner states that there is no need to maintain hemispherical cruising altitudes for de-confliction with manned aircraft. For the above reasons, the petitioner seeks exemption from this regulation. The petitioner states that it will attain an equal level of safety by using the onboard GPS. The E384’s altitude will also be monitored by the PIC and VO.

Regarding the fuel requirements in § 91.151, the petitioner states the E384 is battery-operated, does not carry “fuel,” and the maximum duration of flight from a full battery charge is 100 minutes. Further, the operating documents describe the in-flight battery monitoring system and suggest landing the E384 when the voltage drops below 14.5V. The petitioner also notes that compliance with this regulation would leave the E384 with 70 minutes of flight time, which would be sufficient to carry out imaging of agricultural plots. However, the petitioner request full exemption from this requirement, asserting that it is unnecessary because there are no intended landing points associated with these operations, and because the E384 is capable of landing safely anywhere in its designated operating area once battery power is exhausted. The petitioner asserts that the risk or danger associated with failing to reach a safe landing point with 30 minutes of extra “fuel” does not exist with the E384, and that an equivalent level of safety can be attained because the E384 does not

have to return to a landing point but can be safely put down anywhere over the agricultural plot.

### Public Interest

The petitioner states that by authorizing E384 operations, the FAA would advance the public interest by reducing the number of manned aircraft in the NAS; reducing air and noise pollution; reducing the risk to life and property on the ground; and increasing agricultural economic growth.

The petitioner supports these assertions by listing a number of benefits of E384 operations compared to manned aircraft operations that are used for the same agricultural applications. The petitioner asserts that allowing E384 operations would reduce the burden on air traffic controllers; would reduce air and noise pollution from the manned aircraft that would otherwise be used; would reduce fuel use, as the E384 is battery-powered unlike the manned aircraft it would replace; and would reduce the risk to life and property on the ground, as the E384 contains no pilot and is constructed of a small, lightweight foam airframe.

Finally, the petitioner suggests that the high-resolution image data generated from E384 flights would provide scientists with important information that would assist efforts to maximize crop yields. The petitioner asserts that this would result in a major increase in economic growth, which would be in the public interest.

### **Discussion of Public Comments:**

A summary of the petition was published in the Federal Register on October 17, 2014 (79 FR 62513). The FAA received three comments in regard to the petition for exemption. One commenter supported Pravia, LLC's petition and two opposed it.

In support of Pravia's petition, the Small UAV Coalition (hereafter the Coalition) discussed the UAS Pravia's proposed to use in its other petition for exemption (Docket No. FAA-2014-0789). However, the Coalition's comments were not limited to the merits of one particular UAS, and the FAA will therefore address those comments that are relevant to this petition. 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 Coalition noted the FAA is to consider the seven factors<sup>1</sup> in section 333 as a minimum. The Coalition stated the petition shows the FAA should consider factors other than those specified in section 333, such as location, altitude of its UAS, 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.

The Coalition also commented that the FAA should grant relief from the requirement to hold an airman's certificate, but stated that at a minimum the FAA should provide an exception from part 61 and approve training and testing regiments that pertain to UAS commercial operations pertinent to the aircraft and operation proposed. The Coalition also asserted that Congress intended the section 333 national security criterion to focus on the operation rather than on the pilot and that shifting that focus imposes an unnecessary burden.

In response, as discussed in the grant of exemption to Trimble Navigation Ltd. (No. 11110), neither section 333 nor the FAA's authority to exempt from its regulations found in 49 USC § 44701(f), authorizes the FAA to provide exemption to the statutory requirement to hold an airman certificate as prescribed in 49 USC § 44711. The FAA notes that under this exemption the petitioner proposed to use pilots holding commercial certificates and it will be able to use the training program it proposed. Finally, the FAA does not agree that relying on the pilot certificate for a national security finding poses an unnecessary burden because pilots under this exemption, and the exemptions granted previously to section 333 requests, are already required to hold a pilot certificate to satisfy 49 USC § 44711.

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 and stated that there must be a means both to ensure that the UAS remains within the defined airspace and to ensure that the hazard of other aircraft intruding on the operation is mitigated.

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

ALPA opposed the petitioner's request for exemption from airworthiness certification requirements under 14 CFR part 21 and 14 CFR § 91.203. ALPA suggested that small UAS should be certified to the same level of safety as other aircraft operated commercially in the NAS. The Secretary of Transportation's finding regarding airworthiness certification is discussed below.

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

ALPA asserted that the petition does not clearly state how the pilot and the observer will be able to communicate with each other, and that voice communication with the pilot is a limited mitigation if both the pilot and observer are not able to maintain a visual observation of both the aircraft and the area per FAA N 8900.227. The FAA has inserted a condition regarding PIC and visual observer communications.

ALPA commented that the lithium polymer batteries that serve as the power supply have numerous associated fire and explosion hazards as outlined in DOT/FAA/AR-09/55, “Flammability Assessment of Lithium-Ion and Lithium-Ion Polymer Battery Cell Designed for Aircraft Power Usage (January 2010),” and that the safe carriage of the batteries and the mitigations in place for known risks should be addressed. The referenced study was primarily conducted to determine how certain battery cells react in a fire situation aboard manned airplanes. Given the size of the battery and the operating conditions of the UAS, the FAA concludes that the use of a lithium polymer battery will not pose an undue safety risk for the proposed operations.

ALPA commented that command and control (C2) link failures are one of the most common failures on a UAS, and that lost link mitigations should require safe modes to prevent fly-aways or other scenarios.

The FAA acknowledges the potential safety hazards related to C2 failures identified by ALPA and carefully examined the proposed operation to ensure that the vehicle design and the petitioner’s supporting documentation addressed these potential hazards. 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 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. The FAA has reviewed the concerns expressed in these comments regarding knowledge, training, and medical certification required by holders of commercial certificates. Additional details are available in the ensuing analysis of this issue with regards to 14 CFR part 61.

ALPA stated that although petitioner asked for an exemption from § 91.109 *Flight instruction*, they failed to provide any information regarding the qualifications of the persons providing instruction per 14 CFR § 61.195 which defines the requirements for flight instructors. A certificated flight instructor is authorized to provide the instruction required for the certificates or ratings or currency listed in 14 CFR § 61.193. A person instructing on how to operate the UAS under the petitioner’s training program would not need to be a certificated flight instructor because the instruction is not being provided for a certificate or rating listed in § 61.193. We note that none of the UAS operations proposed by the petitioner require such flight instruction because § 61.31(l) allows for operation of the UAS

by an airman who is current per 14 CFR § 61.56 without a category and class rating. Of course, any instruction provided toward obtaining the pilot certificate required by this exemption would need to be provided by a certificated flight instructor.

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. The FAA notes ALPA's concern and in order to minimize potential impact to the NAS, the FAA requires each operator secure a Certificate of Authorization or COA which covers specific details of the petitioner's operation. The FAA recognizes that UAS integration will generate new NAS access demand and will review and adjust accordingly.

ALPA mentioned the aircraft will not have a barometric altimeter as required by 14 CFR § 91.121, stating the ability to accurately maintain altitude must be addressed, and processes or mitigations, such as redundant control capability, fail-safe systems, backups and specific, validated procedures for system and equipment failures must be in place. The FAA agrees with ALPA and addresses this concern in its analysis of the exemption from 14 CFR § 91.121, finding that the alternative means of compliance proposed by the petitioner does not adversely affect safety.

ALPA stated its position on 14 CFR § 91.119 Minimum safe altitudes: General, asserting ALPA's long-held position is all aircraft in the National Airspace System (NAS) must operate to the same high level of safety, this include maintaining a safe altitude for both airplanes and helicopters. The FAA has analyzed the proposed operations and, as discussed below, determined they will not pose an adverse impact to safety.

Regarding 14 CFR § 91.151 Fuel Requirements, ALPA believes the use of batteries as the only source of power for an aircraft in the NAS is a substantial shift from traditional propulsion methods on which current safety margins are based, and requires more regulator exploration to determine best safety practices. This comment is addressed in detail below.

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 aviation safety, and agricultural pilots depend on pilots of other aircraft to perform their see-and-avoid functions to prevent collisions. NAAA believes 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, receive 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 equipment such as Automatic Dependent Surveillance–Broadcast Out, strobe lighting, and marking to ensure the aircraft is visible to law enforcement, the public, and manned and unmanned aircraft. NAAA proposed that small UAS comply with 18 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:**

Unmanned Aircraft System (UAS)

The petitioner requested relief from 14 CFR part 21, Subpart H, *Airworthiness Certificates*. In accordance with the statutory criteria provided in Section 333 of Pub. 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, Subpart H, 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 5.9 pounds. 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 land 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 lost-link event with pre-coordinated automated landing maneuvers. These safety features provide an equivalent level of safety compared to a manned aircraft holding a restricted airworthiness certificate performing a similar operation.

Regarding the petitioner's requested relief from 14 CFR § 45.23(b) *Display of marks*, 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).

Regarding the petitioner's requested relief from 14 CFR 91 subpart E, the relevant parts of subpart E 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 evaluated the petitioner's request and determined that cause for exemption to these requirements 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.

#### UAS Pilot in Command (PIC)

As described in the petition, the PIC will be a commercially rated pilot with appropriate flight currency who has completed the petitioner's training requirements in accordance with the operating documents. The PIC must complete all manufacturers' recommended training and appropriate flight currency requirements. 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.

Although the petitioner specifies that its PICs will hold commercial pilot certificates, the petition did not specify the class of medical certificate the class of medical certificate that its PICs will possess. In accordance with 14 CFR § 61.23(a)(2), a pilot must hold at least a second class medical certificate when exercising the privileges of a commercial pilot certificate. Therefore, the PICs are required to possess a current second class medical certificate.

The petitioner has also indicated it will supplement its proposed operation(s) with a visual observer (VO), referred to in the petition as a Safety Observer. As in Exemption No. 11062, *Astraeus Aerial*, the FAA agrees with the petitioner's proposed use of a VO and requires a VO to be used in all UAS operations; however, the FAA considers the PIC's ability to maintain VLOS with the UAS to be of primary significance. 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. The conditions and limitations below stipulate that the PIC must ensure that the VO can perform the functions prescribed in the operating documents. Lastly, as discussed in Exemption No. 11109, Clayco, Inc., there are no regulatory requirements for VO medical certificates. A medical certificate is not required for a VO. Moreover, the VO will not be operating the aircraft. Therefore, as in Grant of Exemption No. 11062 to Astraeus, the FAA does not consider a medical certificate necessary for the VO.

### UAS Operating Parameters

Regarding the petitioner's requested 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. Although the petitioner did not seek relief from § 91.7(b), the FAA, as in grant of Exemption No. 11062 to Astraeus, has determined that the operator's manual include procedures to be used prior to each flight that can ensure compliance with § 91.7(b). 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(b) *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 in Grant of Exemption 11062, Astraeus Aerial, that relief from these sections is not necessary. Relevant materials may be kept in a location immediately accessible to the PIC in compliance with the regulations.

Regarding the petitioner's requested relief from 14 CFR § 91.103 *Preflight action*, although there will be no approved Airplane or Rotorcraft Flight Manual as specified in paragraph (b)(1), the FAA believes that the petitioner can comply with the other applicable requirements in § 91.103(b)(2). The procedures outlined in the petitioner's documents address the FAA's concerns regarding compliance with § 91.103(b). The PIC will take all actions including reviewing weather, flight battery requirements, landings, and takeoff distances and aircraft performance data before initiation of flight. The FAA has imposed stricter requirements with regard to visibility and distance from clouds; this is to both keep the UA from departing the VLOS and to preclude the UA from operating in the NAS. The FAA also notes the risks associated with sun glare; the FAA believes that the PIC's and VO's ability to still see other air traffic, combined with the PIC's ability to initiate a return-

to-home sequence, are sufficient mitigations in this respect. The PIC will also account for all relevant site-specific conditions in his or her preflight procedures. Therefore, the FAA finds that exemption from 14 CFR § 91.103 is not necessary.

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. The petitioner did, however, assert that because the E384 ground control station consists of a RX9 controller and PC computer, it will be accessible to both an instructor and a student at all times, as the controls can be passed back and forth between the instructor and student, thus achieving an equivalent level of safety as having two sets of controls. The FAA finds an equivalent level of safety will be achieved by the training as 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 applicable, because the petitioner states that operations will be conducted only over private and/or controlled access properties.

The petitioner proposes to fly at low altitudes over agricultural plots, which can be categorized as "other than congested areas." Accordingly, this exemption prohibits operations over congested or densely populated areas as stated in the conditions and limitations below. Pilots may obtain information about congested areas from the local Flight Standards District Office (FSDO).

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 an altitude of 500 feet above the surface over "other than congested areas," except over open water or sparsely populated areas. Section 91.119(c) provides that in operations over water or sparsely populated areas, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

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 5.9 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 UAS will not have a typical barometric altimeter onboard the aircraft. Rather, it uses information generated from GPS to transmit altitude information to the PIC. The petitioner states:

An equal level of safety will be achieved through the E384's GPS, which provides altitude and location data to the PIC via the ground control station. The E384 Operations Manual specifically addresses checking the GPS read-out to ensure that it's within tolerance prior to commencing flight operations. This, combined with the fact that the aircraft's altitude will be visually monitored by the PIC and Safety Observer, ensures an equal level of safety is attained in lieu of referencing an altimeter setting.

As stated in the conditions and limitations below, the FAA requires any altitude reported to ATC to be in feet AGL. The petitioner may choose to set the GPS altitude indicator to zero feet AGL rather than local barometric pressure or field altitude before flight. The petitioner also states that the E384 can be flown manually. The FAA notes that the petitioner's operating documents do not address GPS failure and that the operating documents must be amended to include emergency procedures for loss of GPS prior to operating under this exemption in accordance with the conditions and limitations below. Considering the limited altitude of the proposed operations, relief from 14 CFR § 91.121 is granted to the extent necessary to comply with the applicable conditions and limitations stated below.

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 UA batteries provide approximately 100 minutes of powered flight. Information provided in the operating documents discusses procedures regarding



remaining battery power, including the requirement for the PIC to land the E384 when battery voltage drops below 14.5 volts. Those documents provide explanation of the automatic return to launch process that is executed when the E384 battery power reaches 14.3 volts. The petitioner states, however, that compliance with this regulation would leave the E384 with 70 minutes of flight time, which the petitioner concedes would be sufficient to carry out imaging of agricultural plots. The petitioner is still requesting relief since the UA carries no “fuel” and does not have to return to a “landing point,” but rather can be safely put down anywhere over the agricultural plot.

Given the factors above and since the FAA is requiring that the PIC return the UA to a suitable landing zone when the battery level reaches 14.5 volts as stated in the E384 Flight Procedure section of the operating documents, there is 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 intended landing point and land with a battery level of not less than 14.5 volts.

In evaluating the petitioner’s proposed operating parameters with regard to VLOS and a safe operating perimeter, the FAA considered operations from a moving device or vehicle. Since the petitioner did not discuss provisions for these circumstances, the conditions and limitations below preclude operations from moving devices or vehicles.

Regarding an Air Traffic Organization (ATO) issued Certificate of Waiver or Authorization (COA), the majority of current UAS operations occurring in the NAS are being coordinated through 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 petitioner 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 camera that provides high-resolution image data that would provide scientists with important information to assist efforts to maximize crop yields. According to the petitioner, this would result in increased economic growth. In addition, the petitioner asserts that carrying out these operations using a battery-powered E384 rather than a manned aircraft would result in reduced air and noise pollution, less fuel use, lower burdens on air traffic control, and less risk to life and property on the ground. 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:

<b>Relief considered (14 CFR)</b>	<b>FAA determination (14 CFR)</b>
Part 21, Subpart H	Relief not necessary
45.23(b)	Relief not necessary
91.7(a)	Relief granted with conditions and limitations
91.9(b)	Relief not necessary
91.103	Relief not necessary
91.109	Relief not necessary
91.119	Paragraph (c), relief granted with conditions and limitations
91.121	Relief granted with conditions and limitations
91.151(a)	Relief granted from 91.151(a)(1), day, with conditions and limitations
91.203(a) and (b)	Relief not necessary
91.405(a)	Relief granted with conditions and limitations
91.407(a)(1)	Relief granted with conditions and limitations
91.409(a)(1) and (2)	Relief granted with conditions and limitations
91.417(a) and (b)	Relief 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, Pravia, LLC is granted an exemption from 14 CFR §§ 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 Pravia, 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, Pravia, LLC is hereafter referred to as the operator.

The petition and the following supporting documentation are hereinafter referred to as the operating documents:

- 1) E384 Operations Manual
- 2) E384 Maintenance Manual
- 3) Event 38 Training Syllabus
- 4) Domestic agricultural seed company site information

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 5.9 pounds: E384, manufactured by Event 38 of Akron, Ohio (E384). Proposed operations of any other aircraft will require a new petition or a petition to amend this grant.
2. UAS operations under this exemption are limited to conducting operations for the purpose of aerial imagery to support agriculture.
3. The UA may not be flown at an indicated ground speed exceeding 39 knots (20 m/s).
4. 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.
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.
6. 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. 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 functions prescribed in the operating documents.
7. The VO must not perform any other duties beyond assisting the PIC with seeing and avoiding other air traffic and other ground based obstacles/obstructions and is not permitted to operate the camera or other instruments.
8. The operating documents and this grant of exemption 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 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.

9. 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.
10. 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. The PIC who conducts the functional test flight must make an entry in the aircraft records.
11. The pre-flight inspection must account for all potential discrepancies, e.g. inoperable components, items, or equipment, not already covered in the relevant sections of the operating documents.
12. The operator must follow the UAS manufacturer's aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements.
13. The operator must carry out its maintenance, inspections, and record keeping requirements, in accordance with the operating documents. Maintenance, inspection, alterations, and status of replacement/overhaul component parts must be noted in the aircraft records, including total time in service, description of work accomplished, and the signature of the authorized person returning the UAS to service.
14. Each UAS operated under this exemption must comply with all manufacturer Safety Bulletins.
15. The authorized person must make an entry in the aircraft record of the corrective action taken against discrepancies discovered between inspections.
16. The PIC must possess at least a commercial pilot certificate and at least a current second-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.
17. The operator may not permit any PIC to operate unless the PIC meets the operator's qualification criteria and 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 must be logged in a manner consistent with 14 CFR § 61.51(b). The VO is also required to complete the operator's training requirements. 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, 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.

18. 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.
19. The UA may not operate within 5 nautical miles of an airport reference point as denoted on a current FAA-published aeronautical chart unless a letter of agreement with that airport's management is obtained, and the operation is conducted in accordance with a NOTAM as required by the operator's COA. The letter of agreement with the airport management must be made available to the Administrator upon request.
20. 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.
21. 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.
22. The PIC must abort the flight in the event of unpredicted obstacles or emergencies in accordance with the operating documents.
23. 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 with a battery level of not less than 14.5 volts.
24. 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 Airmen (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to the operation. All operations shall be conducted in accordance with airspace requirements in the ATO issued COA including class of airspace, altitude level and potential transponder requirements.
25. 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.

26. 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.
27. 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 UAS is operating. These documents must be made available to the Administrator or any law enforcement official upon request.
28. The UA must remain clear and yield the right of way to all manned aviation operations and activities at all times.
29. The UAS may not be operated by the PIC from any moving device or vehicle.
30. The UA may not be operated over congested or densely populated areas.
31. Flight operations must be conducted at least 500 feet from all nonparticipating persons (persons other than the PIC, VO, operator trainees or essential 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 owner/controller of such vessels, vehicles or structures has granted permission and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard, and;
  - 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).
32. 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.
33. 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](http://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 29, 2015.

/s/

John Barbagallo

Acting Deputy Director, Flight Standards Service