

Exemption No. 11172
UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, DC 20591

In the matter of the petition of

**BLUE-CHIP UNMANNED AERIAL
SOLUTIONS, INC. dba BLUE-CHIP
UAS**

for an exemption from part 21, Subpart
H; §§ 45.23(b), 91.7(a), 91.103,
91.119(c), 91.151(a), 91.405(a),
91.407(a)(1), 91.409(a)(2), and
91.417(a) and (b) of Title 14, Code of
Federal Regulations

Regulatory Docket No. FAA-2014-0787

GRANT OF EXEMPTION

By letter dated September 30, 2014, and an amended letter dated November 20, 2014,¹ Mr. Clint P. Stevens, Executive Director and Co-Founder, Blue-Chip Unmanned Aerial Solutions, Inc. (Blue-Chip UAS) petitioned the Federal Aviation Administration (FAA) for an exemption from part 21 Subpart H; §§ 45.23(b), 91.7(a), 91.103, 91.119(c), 91.151(a), 91.405(a), 91.407(a)(1), 91.409(a)(2), and 91.417(a) and (b) of Title 14, Code of Federal Regulations (14 CFR). The exemption would allow operation of the Sensurion Magpie MP-1 unmanned aircraft systems (UAS) for the purpose of supporting the agriculture, oil and gas, aerial photography and wildlife preservation industries.

The petitioner requests relief from the following regulations:

Part 21 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

¹ The petitioner withdrew its initial requested relief from §§ 61.113(a) and (b), 61.133(a)(1)(ii), 91.109(a), and 91.121.

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 91.103 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 91.119 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 91.151(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 91.405(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 that no person may operate any 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) prescribe, 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 that 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) 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 shall be retained until the defects are repaired and the aircraft is approved for return to service.

The petitioner supports its request with the following information:

The petitioner proposes to operate the Sensurion Magpie MP-1 for the purpose of supporting the agriculture, oil and gas, aerial photography and wildlife preservation industries. See Appendix A for the petition submitted to the FAA describing the proposed operations.

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

- 1) Blue-Chip Flight Planning Document,
- 2) Blue-Chip Summary of Changes and Revised Exemption Request
- 3) Sensurion Aerospace Operator Manual Magpie MP-1 Small Unmanned Aircraft System, Version A-1,

- 4) Sensurion Aerospace Maintenance Manual Magpie MP-1 Small Unmanned Aircraft System, Version A-2.

Discussion of Public Comments:

A summary of the petition was published in the Federal Register on October 17, 2014 (79 FR 62510). The FAA received comments from 3 organizations regarding the notice of petition for exemption. The Small UAV Coalition (hereafter the Coalition) supported Blue-Chip Unmanned Aerial Solutions, Inc.'s petition. The Air Line Pilots Association, International (ALPA) and the National Agricultural Aviation Association (NAAA) opposed it.

In support of the petition, the Small UAV Coalition (Coalition) states the petitioner has proposed to abide by stronger safety measures than hobby and modeler groups operating similar aircraft. The Coalition states that it does not believe that heightened safety measures should be required for the petitioner simply because of the commercial nature of its operations. 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 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 factors² 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

² 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; ..."

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 private 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 Coalition commented that a visual observer (VO) should not be required for all small UAS operation. The Coalition further asserted that the presence of one or more VOs may allow the UAS to be operated beyond VLOS of the PIC and that the petitioner's proposal to operate the UA within VLOS of the PIC *and/or* VO should be permitted. The FAA notes that one of the determinations for operations under section 333 is operation within visual line of sight. As the PIC is determined to be in command of the UA, he must maintain VLOS while operating the UA. The FAA also notes that a visual observer complements the PIC's capability to see and avoid other aircraft, including when the PIC may be momentarily attending to other flying tasks (e.g., maneuvering the aircraft close to actors and actresses and other objects on a film set). The VO provides an additional level of operational safety.

The Coalition also asserts that the petitioner's pledge to avoid congested areas, as well as its procedures for notifying airport operators of any planned operations within 5 miles of an airport, are adequate to ensure safe UAS operations. Therefore, the Coalition argues, additional and more stringent requirements imposed by the FAA, such as obtaining a prior agreement with airport management, are unwarranted.

ALPA expresses concern regarding several aspects of the petition. ALPA notes the petitioner's reference to operations conducted within "limited or predetermined" sterile areas is not defined, nor does the petitioner detail procedures for controlling the airspace or area of operation. Specifically, ALPA states "there must be means both to ensure that the sUAS 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.

Regarding the petitioner's statement that the PIC and observer will be able to communicate by voice or text, ALPA notes that text messaging could have an unknown latency extending to several minutes. ALPA also states that the pilot and observer should be able to maintain a visual observation of the aircraft and area of operation when using voice communication. NAAA states UAS observers must be present and able to communicate with the operator from the most minimal distance possible. The FAA has inserted a condition regarding PIC and visual observer communications.

ALPA asserts the UAS's lithium polymer batteries 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 comments 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 agrees and carefully examined the proposed operation to ensure that the vehicle design and the petitioner's operating documents 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. The FAA also finds that the operating documents have incorporated safety procedures to be followed by all operational participants should a C2 failure occur. Further detail is contained in the analysis of the UAS below.

ALPA also notes that the petitioner's proposed operations are for "compensation or hire," and argues 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 make and model intended to be used. Similarly, ALPA asserts a current second-class airman medical certificate should be required. NAAA also commented on pilot qualification, stating—

Just as manned aircraft pilots are required to undergo a rigorous training curriculum and show that they are fit to operate a commercial aircraft, so too must UAS operators. Holding a commercial certificate holds UAS operators to similar high standards as commercial aircraft operators and ensures they are aware of their responsibilities as commercial operators within the NAS. Medical requirements ensure they have the necessary visual and mental acuity to operate a commercial aircraft repeatedly over a sustained period of time.

The FAA has reviewed the knowledge and training required by holders of both private and commercial certificates. Additional details are available in the ensuing analysis of this issue with regards to 14 CFR § 61.113.

ALPA opposes an exemption from the pre-flight action requirements of § 91.103. In addition, although the petitioner did not request an exemption from § 91.113, ALPA notes the petitioner must specify a means to meet see and avoid requirements in § 91.113 given the absence of an onboard pilot. This comment is addressed in detail in the FAA analysis below.

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. As stated in the petitioner's response to this comment the Sensurion Magpie MP-1 vehicle is equipped with a barometric altimeter and withdrew its request for exemption to this section.

Regarding the fuel requirements of § 91.151, ALPA argues that using batteries as the only source of an aircraft's power is a substantial shift from traditional methods of propulsion, and requires further research to determine best safety practices. This comment is addressed in detail below.

Regarding §§ 91.405(a), 91.407(a)(1), 91.409(a)(2), and 91.417(a) and (b), ALPA opposes the petitioner's attempt to avoid compliance with established aircraft maintenance and recordkeeping requirements. ALPA states the UAS should comply with the same level of safety as other aircraft operated commercially in the NAS. This comment is addressed in detail below.

ALPA also expresses concern that the petitioner's waiver request is not for a single specific operation or location, but for all operations of the same general type. ALPA states this results in a considerable increase in the FAA's oversight tasks. 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 Waiver or Authorization (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 also expressed concern that the petition makes no reference to compliance with, or a request for waiver from, 14 CFR 61.195, *Flight instructor limitations and qualifications*, 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. Instruction provided toward obtaining the pilot certificate required by this exemption would need to be provided by a certificated flight instructor.

NAAA noted that its members operate in low-level airspace, and therefore clear low-level airspace is vital to the safety of their operations. 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 believes UAS operations at low altitudes will increase the potential for collision with agricultural aircraft. The FAA recognizes these concerns and has incorporated associated conditions and limitations into this exemption, including: a) a Notice to Airman (NOTAMs) issued for all operations, b) operations conducted within VLOS of the pilot in command (PIC) and the VO, and c) the UAS PIC must always yield right-of-way to manned aircraft.

NAAA stated that FAA airworthiness certification should be a requirement for all unmanned aircraft to operate within the NAS. NAAA recommended UAS be equipped with ADS-B or similar identification and positioning systems, strobe lights, high-visibility markings and registration numbers. NAAA also recommended UAS be operated strictly within the line-of-sight of the ground controller, with the assistance of a visual observer and well clear of any low-flying manned aircraft. As discussed in greater detail below, Section 333 of the FAA Modernization and Reform Act of 2012 authorizes the Secretary of Transportation to determine,

considering a number of factors laid out in the statute, that an airworthiness certificate is not necessary for certain operations. The Secretary has made that determination in this case and therefore the aircraft operated by the petitioner will not need to be certificated by the FAA. 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:

The FAA has organized its analysis into four sections: (1) UAS, (2) UAS pilot in command (PIC), (3) UAS operating parameters, and (4) public interest.

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 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. Because the Secretary of Transportation has determined that no airworthiness is required the requested relief from 14 CFR part 21, and any associated noise certification and testing of part 36, is not necessary.

Manned aircraft conducting aerial surveying operations can weigh 5,000 to 7,000 lbs. or more and are operated by an onboard pilot, in addition to other onboard crewmembers, as necessary. The petitioner's UA has a maximum weight of 10.5 lbs. The pilot and crew will be remotely located from the aircraft. The limited weight and construction with impact absorbent materials significantly 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 aerial surveying operation.

Manned aircraft are at risk of fuel spillage and fire in the event of an incident or accident. The Sensurion Magpie 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 a pre-coordinated, predictable, automated flight maneuver. 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*, because the petitioner's UAS will not be certificated under 14 CFR § 21.191, a grant of exemption for 14 CFR § 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. The petitioner indicates it will comply with the requirement in § 45.29(f) that markings must be as large as practicable.

Regarding the petitioner's requested relief from §§ 91.401-417, the FAA has determined that relief from the following sections is required: 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 preflight checks for the UAS. The FAA finds that adherence to the operating 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)

Although the petitioner amended its petition withdrawing the original request for relief under § 61.113(a) and (b) *Private pilot privileges and limitations*, the need for an exemption under § 61.113(a) and (b) is necessary as the petitioner proposed its PIC hold a private versus commercial airman certificate.

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 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), 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.

The FAA has analyzed the petitioner's proposed operation, considered the comments to the petition on this subject, and determined it does not differ significantly from the situation described in Grant of Exemption No. 11062 (Astraeus). The petitioner plans to operate in the NAS over property over which they have secured written permission from the property owner/controller. 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 [ref: Exemption No. 11062], and 3) the airmanship skills necessary to operate the UAS, the FAA finds that the additional manned airmanship experience of a commercially certificated pilot would not correlate to the airmanship skills necessary for the petitioner's proposed 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.

The petitioner indicates in addition to its private pilot certificate and its requirements, the petitioner will require the PIC to complete all the training and qualifications in the operating documents including: 1) the manufacturer's initial certification training, 2) the petitioner's UAS

qualification program, which includes 50 operational hours in petitioner's UAS, and 3) a written test and "check ride" before receiving a PIC rating. The manufacturer's training includes a variety of tasks which could relate to the specific conditions and limitations below such as the ability to maneuver near but maintain specific distances from persons and property, respond to unexpected emergencies, or avoid objects as well as the ability to avoid potential conflicts with manned aircraft. The FAA has determined that this training and qualifications are adequate to practice and build proficiency in these skills. The petitioner is responsible for assessing its operations and identifying any additional skills required to operate safely under normal and abnormal conditions. Normal condition skills may include the ability to maintain altitude, maintain VLOS, and navigational skills. Abnormal condition skills may include the ability to avoid obstacles, avoid air traffic, and respond to loss of link.

The FAA finds that a PIC holding a private pilot certificate and a third-class airman medical certificate, and who has completed petitioner's training and qualifications and logged their flight hours in a manner consistent with 14 CFR § 61.51(b), can conduct the proposed operations without adversely affecting the safety of the NAS. 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), provided the conditions and limitations outlined below, is warranted. Furthermore, the FAA finds that the requested relief from 14 CFR § 61.133(a) is not necessary for petitioner to conduct its operations. The FAA finds that at a minimum, the flight-hour requirements proposed by petitioner are appropriate to practice and build proficiency in the skills necessary to safely conduct the petitioner's proposed operations.

The FAA also finds that prior documented flight experience that was obtained in compliance with applicable regulations would satisfy this requirement. Training, proficiency, and experience-building flights can also be conducted under the grant of exemption to accomplish the required flight time. During training, proficiency, and experience-building flights the PIC is required to operate the unmanned aircraft (UA) with appropriate distances in accordance with 14 CFR § 91.119.

The petitioner may determine through its safety assessment that additional hours are necessary to address all potential flight hazards and requisite airmanship skills. Consequently, the FAA has included in the conditions and limitations below that the petitioner may not permit any PIC to operate unless that 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.

The petitioner has also indicated it will supplement its proposed operation(s) with a VO. The VO must complete all training contained in the petitioner's operating documents. The conditions and limitations below stipulate that the PIC must ensure that the VO can perform the functions prescribed in the operating documents. Additionally, as discussed in Exemption No. 11109 to Clayco, Inc., 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 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. The FAA finds that the PIC can comply with this requirement.

Regarding the petitioner's requested relief from 14 CFR § 91.103, *Preflight Action*, the petitioner requires each PIC to take certain actions before flight to ensure the safety of the flight. The exemption is needed because the pilot will take separate preflight actions as referenced in the operating documents. Although there will be no approved Airplane or Rotorcraft Flight Manual available, the FAA believes that the petitioner can comply with the other applicable requirements in 14 CFR § 91.103(b)(2). The procedures outlined in the operating 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 keep the UA from departing the VLOS. 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 petitioner's requested relief from § 91.119(c), *Over other than congested areas*, relief is necessary because the aircraft will be operated at altitudes below 250 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:

- the UA will not operate within 250 ft. to any improved roads, vehicles, persons or structures (other than those being inspected as part of the flight operation).

- All objects/hazards will be identified and geo-located prior to flight to be utilized within the flight planning stages.
- All operations will be conducted in rural environments and outside of city limits.
- All operations will be conducted over private or controlled access property.
- Permission from property owner/controller will be obtained prior to the beginning of every flight.
- Petitioner will file a NOTAM for each flight.

The petitioner proposes to operate within 250 feet from non-participating persons, vessels, vehicles and structures. However, § 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. 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). 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.

The FAA has also considered that the UA will weigh about 11 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 property 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.

Operations closer than 500 feet to essential persons (i.e. PIC, VO, trainees, etc.), are permitted when operationally necessary. However at no time can operations be conducted so close to present an undue hazard to the essential persons per § 91.119(a).

The petitioner proposed notifying the appropriate agency if the operation of the UAS will be within the boundaries of Class E and G airspace. The FAA Air Traffic Organization reviews all proposed UAS operations and evaluates the safety of these operations relative to the requested airspace through the existing Certificate of Waiver or Authorization (COA) process. 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 process 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.

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.

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 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 petitioner's only reference to this section is its commitment to land the UAS with 10% battery energy remaining. The manufacturer's recommendations in the operating documents indicate that the UA should normally return to home with 20-30% battery remaining. The operating documents include mission planning instructions that require all flights be planned to reach the intended landing point and land with at least twenty minutes of battery power in reserve. Therefore, the FAA finds cause to prohibit the PIC 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 twenty minutes of battery power remaining.

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 and battery time remaining in minutes and seconds to the PIC. The petitioner plans to meet the intent by maintaining no less than 10 percent of remaining battery power which is adequate to return the UAS to its planned landing zone from anywhere in its operating area. In the event that the Magpie UAS should run out of power, it would simply land within the access controlled operating area. Given the limitations on its proposed operations and the location of those proposed operations, a reduced minimum power reserve for flight in daylight 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 Magpie 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, to fly after that until reaching 10% (percent) of remaining battery power.

Public Interest

The FAA finds that a grant of exemption is in the public interest. The enhanced safety achieved using a UA with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest. The FAA also finds that UAS provide an additional tool for the agricultural, oil and gas, aerial photography, and wildlife preservation industries, adding a greater degree of flexibility, which supplements the current capabilities offered by manned aircraft.

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

Relief considered (14 CFR)	FAA determination (14 CFR)
21 Subpart H	Relief not necessary
45.23(b)	Relief not necessary
61.113(a) and (b)	Relief granted with conditions and limitations
91.7(a)	Relief granted from 91.7(a), with conditions and limitations
91.103	Relief not necessary
91.119	Relief granted from paragraph (c) with conditions and limitations
91.151(a)	Relief granted from 91.151(a)(1), day, with conditions and limitations
91.405(a)	Relief granted with conditions and limitations
91.407(a)(1)	Relief granted with conditions and limitations
91.409(a)(2)	Relief granted with conditions and limitations; relief from 91.409(a)(1) also granted with conditions and limitations
91.417(a)(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, Blue-Chip Unmanned Aerial Solutions Inc. dba as Blue-Chip UAS, is granted an exemption from 14 CFR §§ 61.113(a) and (b), 91.7(a), 91.119(c), 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1), 91.409(a)(2) and 91.417(a) and (b) to the extent necessary to allow the petitioner to operate an unmanned aircraft systems (UAS) for the purpose of conducting operations for the agriculture, oil and gas, aerial photography and wildlife preservation industries. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

Relative to this grant of exemption, Blue-Chip Unmanned Aerial Solutions Inc. (Blue-Chip UAS), is hereafter referred to as the operator.

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

- 1) Blue-Chip Flight Planning Document,
- 2) Blue-Chip Summary of Changes and Revised Exemption Request
- 3) Sensurion Aerospace Operator Manual Magpie MP-1 Small Unmanned Aircraft System, Version A-1,

- 4) Sensurion Aerospace Maintenance Manual Magpie MP-1 Small Unmanned Aircraft System, Version A-2.

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 less than 10.5 pounds: Sensurion Aerospace Magpie MP-1 Small UAS. 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 supporting the agriculture, oil and gas, aerial photography and wildlife preservation industries.
- 3) The UA may not be flown at an indicated airspeed exceeding 68 knots.
- 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 UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times. Electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the functions prescribed in the operating documents.
- 6) 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.
- 7) 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 an

amendment to its grant of exemption. The FAA's UAS Integration Office (AFS-80) may be contacted if questions arise regarding updates or revisions to the operating documents.

- 8) 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 UAS 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.
- 9) 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.
- 10) The pre-flight inspection section in the operating documents must account for all potential discrepancies, e.g. inoperable components, items, or equipment, not already covered in the relevant sections of the operating documents.
- 11) The operator must follow the UAS manufacturer's aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements.
- 12) 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.
- 13) Each UAS operated under this exemption must comply with all manufacturer Safety Bulletins.
- 14) The authorized person must make an entry in the aircraft record of the corrective action taken against discrepancies discovered between inspections.
- 15) The PIC must possess at least a private airman 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.
- 16) 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 and currency 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.

- 17) 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. Flights under special visual flight rules (SVFR) are not authorized.
- 18) 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.
- 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 20 minutes of 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. 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.
- 24) The UA may not be operated from an elevated platform.
- 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, 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 property owner/controller or authorized representative. Permission from property 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.

Unless otherwise specified in this grant of exemption, the unmanned aircraft system (UAS), pilot in command (PIC), and operator must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 61, and 91.

This exemption terminates on February 28, 2017, unless sooner superseded or rescinded.

Issued in Washington, DC, on February 10, 2015.

/s/

John Barbagallo

Acting Deputy Director, Flight Standards Service