Exemption No. 11175

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

In the matter of the petition of **STATE FARM MUTUAL AUTOMOBILE INSURANCE COMPANY** for an exemption from part 21Subpart H; §§ 45.23(b); 45.27; 61.113(a) and (b); 91.119(c); 91.121; 91.151(a); 91.405(a); 91.407(a)(1); 91.409(a)(1) and (2); and 91.417(a) and (b) of Title 14, Code of Federal Regulations	**Regulatory Docket No. FAA–2014–0846**

GRANT OF EXEMPTION

By letter dated October 15, 2014, Mr. Jack Weekes, Operations Vice President for State Farm Mutual Automobile Insurance Company (hereinafter Petitioner or Operator), One State Farm Plaza, Bloomington, IL 61710-0001, petitioned the Federal Aviation Administration (FAA) for an exemption part 21 Subpart H; §§ 45.23(b), 45.27, 61.113(a) and (b), 91.119(c), 91.121, 91.151(a), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b) of Title 14, Code of Federal Regulations (14 CFR). The exemption would allow the petitioner to operate the Aerialtronics Altura Zenith ATX8[1] unmanned aircraft system (UAS) to conduct roof inspections.

The petitioner requests an exemption 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

[1] The petitioner listed one aircraft in the petition, the Aerialtronics Altura Zenith ATX8, however it submitted manuals for the ATX8 and three other aircraft to the FAA. The petitioner later clarified that it was only seeking authority to use the ATX8. *See* Record of Conversation, Docket FAA-2014-0846 (Feb. 4, 2015).

approvals. Subpart H—Airworthiness Certificates prescribes the procedural requirements for the issue of airworthiness certificates.

Section 45.23(b) prescribes, in pertinent part, that when marks include only the Roman capital letter "N" and the registration number is displayed on limited, restricted or light-sport category aircraft or experimental or provisionally certificated aircraft, the operator must also display on that aircraft near each entrance to the cabin, cockpit, or pilot station, in letters not less than 2 inches nor more than 6 inches high, the words "limited," "restricted," "light-sport," "experimental," or "provisional," as applicable.

Section 45.27 prescribes, in pertinent part, the location of marks for non-fixed-wing aircraft requiring the marks required by §45.23.

Section 61.113(a) and (b) prescribes that—

(a) No person who holds a private pilot certificate may act as a pilot in command (PIC) of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as PIC of an aircraft.

(b) A private pilot may, for compensation or hire, act as PIC of an aircraft in connection with any business or employment if—

(1) The flight is only incidental to that business or employment; and

(2) The aircraft does not carry passengers or property for compensation or hire.

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

(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.

Section 91.121 requires, in pertinent part, each person operating an aircraft to maintain cruising altitude by reference to an altimeter that is set "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; or (2) At night, to fly after that for at least 45 minutes.

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) prescribes that no person may operate any 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)(1) and (2) prescribes, in pertinent part, that –

(a) Except as provided in paragraph (c) of this section, no person may operate an aircraft unless, within the preceding 12 calendar months, it has had—

(1) An annual inspection in accordance with part 43 of this chapter and has been approved for return to service by a person authorized by §43.7 of this chapter; or

(2) An inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.

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

(a) Each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:

(1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—

(i) A description (or reference to data acceptable to the Administrator) of the work performed; and

(ii) The date of completion of the work performed; and

(iii) The signature and certificate number of the person approving the aircraft for return to service.

(2) Records containing the following information:

(i) The total time in service of the airframe, each engine, each propeller, and each rotor.

(ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.

(iii) The time since last overhaul of all items installed on the aircraft 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 its UAS to conduct commercial operations to obtain images of its policyholders' roofs to determine the nature and extent of damage to the roof surface. See Appendix A for the petition submitted to the FAA describing the proposed operations.

The petitioner has provided certain information to support its request for an exemption, which includes proprietary supporting documents. The petition and the following supporting documentation are hereinafter referred to as the operating documents:

1) State Farm UAS Training Course Syllabus
2) State Farm UAS Operations Manual[2]

Discussion of Public Comments:

A summary of the petition was published in the Federal Register on November 13, 2014, (79 FR 67537). The FAA received three comments on the petition for exemption. The Small UAV Coalition (Coalition) supported the petition, and 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 non-commercial 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. 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 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 the location and altitude of its small UAV operations. 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 exemption from part 61 and approve training, experience, 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.

[2] Appendix E Aerialtronics Zenith ATX8 Operations Manual and Appendix F Aerialtronics System Description Manual are considered part of the operating documents for this grant of exemption. References to the Nova F6500, MP32, and VP23 aircraft in the training syllabus and operations manual are not considered part of the operating documents.

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 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 visual observers (VO) may allow the UAS to be operated beyond visual line of sight (VLOS) of the pilot in command (PIC) and that the petitioner's proposal to operate the unmanned aircraft (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 PICs 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 stated that submitting a plan of activities *"in all cases"* should not be required of small UAS operators and notifying the FAA should be necessary only when there is a potential conflict with manned aircraft operations because of the altitude of the UAV operation or its proximity to airports. The FAA notes that a plan of activities is only required for motion picture and television filming operations as is required for the same operations conducted by manned aircraft, thus assuring an acceptable level of safety.

The Coalition also commented that in the case of the petitioner's proposed operation over a residential or commercial property under 200 feet AGL and with both horizontal and vertical geo-fencing that it is not necessary to obtain a letter of agreement when in proximity of non-towered airports, rather, that the petitioner be mindful of any nearby airfields and knowledgeable about arrival and departure paths. These comments are addressed in the FAA's analysis and conditions and limitations regarding Certificates of Waiver and Authorization (COA).

ALPA expressed 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 200 feet above ground level (AGL) with a VO) are

sufficient mitigations to this risk so that the operations will not adversely affect safety. Additionally, the petitioner will utilize geo-fencing around the owner's property line to ensure the Zenith ATX8 remains within defined boundaries.

ALPA stated 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 asserted 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 FAA notes that 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 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.

Although the petitioner did not request an exemption from § 91.203, ALPA stated the UAS should be certified to the same level of safety under § 91.203 as other commercially operated aircraft in the National Airspace System (NAS). These comments are addressed in the FAA's conditions and limitations below.

ALPA also noted 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 asserted a current second-class airman medical certificate should be required. The National Agricultural Aviation Association (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.

Although the petitioner did not request an exemption from § 91.113, ALPA noted 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 expressed concerns on pilot and VO communication noting the petitioner states that the pilot and the observer will be able to communicate verbally. ALPA stressed when voice communication is used, both the pilot and observer should be able to maintain a visual observation of both the aircraft and the area of operation. These comments are addressed in the FAA's analysis and conditions and limitations 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. 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.

Regarding the fuel requirements of § 91.151, ALPA argued 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) *[sic]*, and 91.417(a) and (b), ALPA opposed the petitioner's "attempt to avoid compliance with established aircraft maintenance and record keeping" requirements. ALPA stated 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 expressed 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 stated this results in a considerable increase in the FAA's oversight tasks. The FAA notes ALPAs concern and in order to minimize potential impact to the NAS, the FAA requires each operator secure a COA which covers specific details of the petitioners operation. The FAA recognizes that UAS integration will generate new NAS access demand and will review and adjust accordingly.

ALPA expressed concern regarding the petitioner's waiver request for 14 CFR § 91.119. ALPA stated all aircraft in the NAS must operate to the same high level of safety, this include maintaining a safe altitude for both airplanes and helicopters. These comments are addressed in the FAA's analysis and conditions and limitations below.

NAAA stated it represents the interests of small business owners and pilots licensed as commercial applicators. NAAA explained that 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 for agricultural safety, and agricultural pilots depend on pilots of other aircraft to perform their see-and-avoid functions needed to prevent collisions. NAAA stated UA operations at low altitudes will increase the potential of collision hazards with agricultural aircraft. NAAA argued that until adequate see-and-avoid technology is developed, the FAA should require UAS operators to post a Notice to Airmen (NOTAM) 48 to 72 hours before operations. NAAA proposes UAS aircraft be painted a highly visible color, be equipped with strobe lights, and use Automatic Dependent Surveillance–Broadcast (ADS–B) or other similar location reporting technology. To address these concerns the FAA has incorporated associated conditions and limitations into this exemption, including: a) NOTAMs issued for all operations, b) operations conducted within VLOS of the PIC and the VO, and c) the UAS PIC must always yield right-of-way to manned aircraft.

NAAA also proposed a number of operating limitations and requirements for UAS operators. NAAA stated UAS operators should have procedures to immediately ground the UAS if another low-flying aircraft is within 2 miles; be attending/monitoring UAS at all time and attentive to surroundings (no headphones, etc., or other distractions); comply with all applicable regulations, policies, and procedures; be equipped with aviation radios set to a locally defined frequency; have a separate VO with a second-class medical certificate and perform duties for only one UAS at a time; maintain line-of-sight operations; and be well-versed in the UAS operator document. NAAA further stated the UAS should be properly maintained, have a registered N-Number on an indestructible and unmovable plate, and be required to have an airworthiness certificate and liability insurance. These comments are addressed in the FAA's analysis and conditions and limitations.

The FAA's analysis is as follows:

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

UAS

The petitioner requested relief from 14 CFR part 21, Certification procedures for products and parts, Subpart H—Airworthiness Certificates prescribes the procedural requirements for the issue of 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. Therefore, the FAA finds that the requested relief from 14 CFR part 21, and any associated noise certification and testing requirements of part 36, is not necessary.

The petitioner's UA will weigh less than 19 lbs. with no onboard pilot or crew. The pilot and crew will be remotely located from the aircraft. The limited weight significantly reduces the potential for harm to participating and nonparticipating individuals or property in the event of an incident or accident.

This exemption does not require an electronic means to monitor and communicate with other aircraft, such as transponders or sense and avoid technology. Rather the FAA is mitigating the risk of these operations by placing limits on altitude, requiring stand-off distance from clouds, permitting daytime operations only, and requiring that the UA be operated within VLOS and yield right of way to all other manned operations. Additionally, the exemption provides that the operator will request a NOTAM prior to operations to alert other users of the NAS. These mitigations address concerns raised by NAAA and ALPA regarding awareness of UAS operations occurring in the airspace.

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 performing a similar operation and address ALPAs comment on mitigating risk of command and control link failures.

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 "limited," "restricted," or "experimental" will be required as a condition of a grant of exemption. However, these markings are reserved for aircraft that are issued certificates under 14 CFR §§ 21.185, 21.189, or 21.191. The petitioner's UAS will not be certificated under §§ 21.185, 21.189, or 21.191, therefore these markings are not required and exemption from § 45.23(b) is not necessary.

The petitioner has also requested relief from 14 CFR § 45.27(a), *Location of marks*. Given that an exemption from § 45.23(b) is not necessary, an exemption from § 45.27(a) is also not necessary. Markings must be as large as practicable per § 45.29(f).

Regarding the petitioner's requested relief from 14 CFR § 91.405 (a) *Maintenance required,* 91.407(a)(1) O*peration after maintenance, preventive maintenance, rebuilding, or alteration,* 91.409(a)(1) and (a)(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 Zenith ATX8 UAS operating documents contain detailed preflight checks, as well as routine maintenance, preventative maintenance, replacement/overhaul of component parts and alterations for the UAS. Also, Zenith ATX8 operators are required by Aerialtronics to return the UAS to the manufacturer every 60 hours for maintenance purposes. The FAA finds that adherence to the Zenith ATX8 operations manual and the petitioner's operating documents, as required by the conditions and limitations below are 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 PIC

The petitioner states the aircraft will be operated in the field with a minimum of a private pilot PIC, a ground-based VO, and a team leader in accordance with its operating documents.

Regarding the petitioner's requested relief from 14 CFR § 61.113 *Private pilot privileges and limitations,* the FAA must consider the appropriate level of pilot certification for the petitioner's proposed operations. The petitioner states it would operate its UAS with a private pilot holding a third-class airmen medical 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. Additionally, as previously determined by the Secretary of Transportation, the requirement to have an airman certificate ameliorates security concerns over civil UAS operations conducted in accordance with Section 333.

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

With regard to the airmanship skills necessary to operate the UAS, in accordance with the petitioner's operating documents, the PIC must accumulate and log a minimum of 200 flight cycles, 25 hours of total time as a UAS rotorcraft pilot, and at least ten hours as a UAS pilot with a similar UAS type (single blade or multi-rotor). The conditions and limitations below stipulate that the petitioner may not permit any PIC to operate unless that PIC has demonstrated through the petitioner's training and currency requirements that the PIC is able to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from people, vessels, vehicles and structures.

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

The FAA considers the PIC to be designated for the duration of the flight. Therefore, per the conditions and limitations below, the PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight.

The petitioner has also indicated it will supplement his proposed operation(s) with a VO. 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

Although the petitioner did not seek 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. 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 § 91.119(c) *Minimum safe altitudes Over other than congested areas,* relief is sought because the petitioner states that operations will only be conducted within a restricted area where buildings and people will not be exposed to operations without their pre-obtained consent. Using the UA's geo-fencing capabilities, the petitioner proposes to operate the UA no more than 200 feet above ground level and only over the consenting policy holder's property. The petitioner further states that the UAS will not be operated over any person other than participating personnel at an altitude that is hazardous to persons or property on the surface in the event of a UAS failure or emergency.

The petitioner will also display signage notifying the public of UAS operations before beginning operations. Signs will be approximately 18" x 24" in size and will be placed in locations that will be visible from adjacent roadways at least 5 minutes prior to UAS operations. An area will be marked off as the UAS "landing zone." The operating documents state that operations will be conducted as far as practicable from non-participating persons However, the petitioner failed to provide an explanation for exposing nonparticipating persons to increased risk. Therefore, the FAA is requiring that prior to conducting UAS specific 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. the PIC and VO). The FAA has also considered that the UA in this case will weigh 19 pounds or less. If barriers or structures are present that can sufficiently protect nonparticipating persons from being struck by the UA or by debris in the event of an accident then the UA may operate closer than 500 feet to persons afforded such protection. 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. The primary concern, when considering how to immediately cease operations, 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.

Thus, the FAA finds that relief from § 91.119(c) is necessary because all operations will be conducted below 200 feet AGL and may be operated closer than 500 feet from persons, vessels, vehicles, and structures as described above. Provided adherence to the procedures in the operating documents and the additional conditions and limitations outlined below, the FAA finds that relief from § 91.119(c) is warranted.

Regarding the petitioner's requested relief from 14 CFR § 91.121 *Altimeter Settings*, the FAA believes that an altitude reading is a critical safety component of the petitioner's proposed

operation. Although the petitioner will not have a typical barometric altimeter onboard the aircraft, the FAA finds the petitioner's intention to operate the UA within VLOS and at or below 200 feet AGL, combined with the petitioner's intention to provide altitude information to the UAS pilot via a radio communications telemetry data link, which downlinks from the aircraft to the PIC for active monitoring of the flight path, to be a sufficient method for ensuring the UAS operations do not adversely affect safety. The altitude information will be generated by global positioning system (GPS) equipment installed onboard the aircraft, and a static pressure sensor (barometer) which aids in estimating the altitude. Prior to each flight, a zero altitude initiation point will be established and confirmed for accuracy by the UAS PIC. The FAA has determined that good cause exists for granting the requested relief to 14 CFR § 91.121 and this approach satisfies ALPAs concern about the ability of the UAS to accurately maintain altitude.

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 states in the event that the UAS should run out of power, it would simply land within the access controlled operating area. Given its weight and construction material, the risks are less than contemplated by the current regulation. As stated in the UA specifications in the operating documents, the UA batteries provide 35 minutes of powered flight on average. The operating documents indicate that at 30% reserve, the UA will enter a return and land sequence and at 20% reserve, the UA will land immediately. Therefore, the FAA has determined that the PIC will be prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough power to fly at a normal cruising speed to the intended landing point and land the UA with not less than 30% battery power remaining – limiting flights to a maximum of 24 minutes. Therefore, the FAA grants the relief from 14 CFR § 91.151(a) to the extent necessary to comply with the conditions and limitations below.

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

Public Interest

The FAA finds that a grant of exemption is in the public interest. By utilizing UAS technology, the operator will reduce exposure of its personnel to hazards related to accessing and inspecting roofs and rapidly obtain accurate assessments of the roof while remaining safely on the ground. Faster roof damage assessments will also result in faster claims processing and repairs for affected policy holders.

The following table summarizes the FAA's determinations regarding the relief sought by the petitioner:

Relief considered (14 CFR)	**FAA determination (14 CFR)**
Part21, Subpart H	Relief not necessary
45.23(b)	Relief not necessary
45.27	Relief not necessary
61.113(a) and (b)	Relief granted with conditions and limitations
91.7(a)	Relief granted with conditions and limitations
91.119(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
91.405(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, State Farm Mutual Automobile Insurance Company is granted an exemption from 14 CFR §§ 61.113(a) and (b), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the extent necessary to allow the petitioner to operate a UAS for the purpose of conducting roof inspections. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

Relative to this grant of exemption, State Farm Automobile Insurance Company is hereafter referred to as the operator.
The petition and the following supporting documentation are hereinafter referred to as the operating documents:

1) State Farm UAS Training Course Syllabus
2) State Farm UAS Operations Manual

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 is limited to the following aircraft described in the operator's manual, which is a quad rotor aircraft weighing less than 19 pounds maximum takeoff weight: Aerialtronics Altura Zenith ATX8 Unmanned Aircraft System. 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 roof inspection.

3. The UA may not be flown at an indicated airspeed exceeding 39 knots (20m/s).

4. The UA must be operated at an altitude of no more than 200 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 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.

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. 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 their 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 in accordance with the operating documents. The PIC who conducts the functional test flight must make an entry in the UAS aircraft records of the flight. The requirements and procedures for a functional test flight and aircraft record entry must be added to the operating documents.

11. The preflight inspection must account for all discrepancies, i.e. inoperable components, items, or equipment, not covered in the relevant preflight inspection sections of the operating documents.

12. The operator must follow the manufacturer's UAS aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements, with particular attention to flight critical components that may not be addressed in the manufacturer's manuals.

13. The operator must carry out their maintenance, inspections, and record keeping requirements, in accordance with the operating documents. Maintenance, inspection, and alterations must be noted in the aircraft logbook, including total flight hours, description of work accomplished, and the signature of the authorized UAS technician returning the UAS to service.

14. Each UAS operated under this exemption must comply with all manufacturer System and Safety Bulletins.

15. The authorized person must make a record entry in the aircraft record of the corrective action taken against discrepancies discovered between inspections.

16. The PIC must possess at least a private pilot certificate and a third-class airman 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. Prior to operations, the PIC must have completed the operator's training as prescribed in the operating documents. During that training, the PIC must have accumulated and logged, in a manner consistent with 14 CFR § 61.51(b), the minimum hours prescribe in the operating documents as UAS pilot operating the make and model of the UAS to be utilized for operations under the exemption. Training, proficiency, and experience-building flights can be conducted under this grant of exemption to qualify the operator's PIC(s), VO(s) and other essential personnel as defined in the operating documents. However, said training operations may only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights the PIC is required to operate the UA with appropriate distances in accordance with 14 CFR § 91.119.

18. Prior to operations, the PIC must have completed the operator's currency requirements as prescribed in the operating documents. The PIC must have completed at least three take-offs and three landings in the preceding 90 days as UAS pilot operating the make and model of the UAS to be utilized for operations under the exemption to maintain currency. Take-off and landing currency flights can be conducted under this grant of exemption. When establishing or regaining currency, said currency flights may only be conducted during dedicated training/currency sessions. During training, proficiency, experience-building flights, and dedicated currency flights the PIC is required to operate the UA with appropriate distances in accordance with 14 CFR § 91.119.

19. Prior to operations, the PIC, VO, and other essential personnel as defined in the operating documents, must have met all qualification, training, and currency requirements, as outlined in the operating documents. A record of completion of these requirements must be documented and made available to the Administrator upon request.

20. The operator may not permit any PIC to operate unless that PIC has demonstrated through the operator's training and currency requirements and logged in a manner consistent with 14 CFR § 61.51(b) that the PIC is able to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including

evasive and emergency maneuvers and maintaining appropriate distances from people, vessels, vehicles and structures.

21. 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.

22. The UA may not operate within 5 nautical miles of the airport reference point of an airport as denoted on a current FAA-published aeronautical chart.

23. 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.

24. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the private or controlled-access property and land or be recovered in accordance with the operating documents.

25. The PIC must abort the flight in the event of unpredicted obstacles or emergencies in accordance with the operating documents.

26. The PIC is prohibited from beginning a UAS flight unless (considering wind and forecast weather conditions and assuming normal cruising speed) there is enough power to fly to the intended landing point and land the UA with 30% battery power remaining.

27. 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.

28. The operator will comply with all national, state, and local laws and regulations which may require the operator to provide notice to, and coordinate with, first responders, appropriate law enforcement personnel, local municipalities, and other suitable agencies prior to conducting operations involving property damage assessments associated with natural disasters, or other emergencies.

29. 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.

30. 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.

31. The documents required under 14 CFR §§ 91.9 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.

32. The UA must remain clear and yield the right of way to all other manned aviation operations and activities at all times.

33. The UAS may not be operated by the PIC from any moving device or vehicle.

34. The UA may not be operated over congested or densely populated areas.

35. Flight operations must be conducted at least 500 feet from all nonparticipating persons (persons other than the PIC or VO), vessels, vehicles, and structures unless:

    a. Barriers or structures are present that sufficiently protect nonparticipating persons from UA and potential debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately and/or;
    b. The aircraft is operated near vessels, vehicles or structures where the land owner/controller has granted permission and the PIC has made a safety assessment of the risk of operating closer to those objects and;
    c. Operations near the PIC or VO do not present an undue hazard to the PIC or VO, per § 91.119(a).

36. All operations shall be conducted over private or controlled-access property with permission from the land owner/controller or authorized representative. Permission from the authority will be obtained for each flight to be conducted

37. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS-80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

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

Issued in Washington, DC, on February 13, 2015.

/s/
Michael J. Zenkovich
Deputy Director, Flight Standards Service