Exemption No. 11109

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

In the matter of the petition of

CLAYCO, INC.

for an exemption from part 21 and §§ 45.23(b); 61.113(a) and (b); 91.7(a); 91.9(b)(2); 91.103; 91.109; 91.119; 91.121; 91.151(a); 91.203(a) and (b); 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–2014–0507

GRANT OF EXEMPTION

By letter dated July 19, 2014, which included supplemental proprietary information submitted to the Federal Aviation Administration (FAA) under separate cover, Ms. Caroline Saunders, General Counsel, Clayco, Inc., 2199 Innerbelt Business Center Drive St. Louis, Missouri 63114, and Mr. Gabriel Dobbs, Skycatch, Inc., Agent for Clayco, Inc., 524 3rd Street, San Francisco, California 94107 petitioned the FAA on behalf of Clayco, Inc. (Clayco) for an exemption from part 21 and §§ 45.23(b), 61.113(a) and (b), 91.7(a), 91.9(b)(2), 91.103, 91.109, 91.119, 91.121, 91.151(a), 91.203(a) and (b), 91.405(a), 91.407(a)(1), 91.409(a)(2), and 91.417(a) and (b) of Title 14, Code of the Federal Regulations (14 CFR). The exemption would allow commercial operation of small Unmanned Aircraft Systems (sUAS) for aerial imaging to monitor and ensure safety of construction sites.

The petitioner requests relief from the following regulations:

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

Section 45.23(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 61.113(a) and (b) prescribe 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 91.7(a) prescribes that no person may operate a civil aircraft unless it is in an airworthy condition.

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

Section 91.103 prescribes that each PIC shall, before beginning a flight, become familiar with all available information concerning that flight. This information must include—

(b) For any flight, runway lengths at airports of intended use, and the following takeoff and landing distance information:

(1) For civil aircraft for which an approved Airplane or Rotorcraft Flight Manual containing takeoff and landing distance data is required, the takeoff and landing distance data contained therein; and

(2) For civil aircraft other than those specified in paragraph (b)(1) of this section, other reliable information appropriate to the aircraft, relating to aircraft performance under expected values of airport elevation and runway slope, aircraft gross weight, and wind and temperature.

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

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

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

(b) *Over congested areas.* Over any congested area of a city, town, or settlement, or over any open-air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

(c) *Over other than congested areas.* An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

(d) *Helicopters, powered parachutes, and weight-shift-control aircraft.* If the operation is conducted without hazard to persons or property on the surface—

(1) A helicopter may be operated at less than the minimums prescribed in paragraph (b) or paragraph (c) of this section, provided each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA; and

(2) A powered parachute or weight-shift-control aircraft may be operated at less than the minimums prescribed in paragraph (c) of this section.

Section 91.121 prescribes, in pertinent part, 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 91.203(a) prescribes, in pertinent part, that no person may operate a civil aircraft unless it has within it—

(1) An appropriate and current airworthiness certificate; and

(2) An effective U.S. registration certificate issued to its owner or, for operation within the United States, the second copy of the Aircraft Registration Application as provided for in § 47.31(c).

Section 91.203(b) prescribes, in pertinent part, that no person may operate a civil aircraft unless the airworthiness certificate or a special flight authorization issued under § 91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

Section 91.405(a) prescribes, in pertinent part, that each owner of an aircraft operator or owner shall have that aircraft inspected as prescribed in subpart E of this part and shall, between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43, Maintenance, Preventive Maintenance, Rebuilding, and Alteration.

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 this chapter.

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

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 FAA has organized the petitioner's information into four sections: (1) the Unmanned Aircraft System (UAS), (2) the UAS pilot in command (PIC), (3) the UAS Operating Parameters, and (4) the Public Interest.

The petitioner provides a supplemental proprietary Skycatch UAS Flight Manual (the Manual) in support of its exemption request.

Unmanned Aircraft System (UAS)

The petitioner states the sUAS proposed by Clayco is a multirotor vehicle manufactured by Skycatch, Inc., a San Francisco, CA-based company. The petitioner states that given the size and speed of the aircraft and the limited operating area associated with their proposed use, an exemption from part 21, subpart H, Airworthiness Certificates, subject to certain conditions and limitations, is warranted and meets the requirements for an equivalent level of safety under part 11 and section 333 of P.L. 112–95. The petitioner asserts an analysis of these operating conditions demonstrates sUAS operated without an airworthiness certificate in the restricted environment and under the conditions proposed will be at least as safe, or safer, than a conventional aircraft (fixed wing or helicopter) operating with an airworthiness certificate issued under 14 CFR part 21, subpart H and not subject to the proposed conditions and limitations.

The petitioner states the unmanned aircraft (UA) it seeks to operate weigh no more than 10 pounds when fully loaded, operate, under normal conditions, at speeds no greater than 50 mph/ 43.4 knots, carry no explosive materials or flammable liquid fuels, and operate exclusively within a secured area detailed in the Manual, without any pilots or passengers on board. Additionally, the petitioner states that in the event of Global Positioning System (GPS) or communication signal loss, the UA possesses the ability to return to a pre-determined location within the security perimeter, as defined in the Manual, and land. The petitioner states the UA have the capability to abort a flight in case of emergency, facilitated in part by on-board parachutes that can be deployed in the event of motor loss or other emergency. Parachute deployment deactivates the aircraft's motors and enables the vehicle to float to the ground.

The petitioner states even though its sUAS will have no airworthiness certificates, an exemption may be needed from § 45.23(b) as there is no entrance to the cabin, cockpit, or pilot station on which the word "Experimental" can be placed. The petitioner states that given the size of the UA, 2-inch lettering would be impossible. The petitioner asserts that an equivalent level of safety will be provided by having the word "Experimental" marked on the fuselage in accordance with § 45.29(f), enabling the pilots and others working with the UAs to see and observe the aircraft's "Experimental" markings.

The petitioner states that the maintenance requirements in §§ 91.405(a), 91.407(a)(1), 91.409(a)(2), 91.417(a) and (b) apply only to aircraft with an airworthiness certificate and are therefore inapplicable to its sUAS operations. The petitioner states, in place of these requirements, it will perform maintenance by following procedures outlined in the Manual. The Manual prescribes required maintenance and requires the operator to keep a Metadata diagnostic log pertaining to each flight. The petitioner notes that because of the aircraft's limited size, payload, and operational constraints, immediate landings can be performed in case of mechanical issues. The petitioner further asserts that the monthly and yearly maintenance use of this diagnostic data will allow Clayco to efficiently maintain UAS components by the data system alerts to Clayco should a component require service. The Metadata diagnostic system used to monitor the UAS components will provide an equivalent level of safety in the maintenance and operation of the Skycatch UAS.

UAS Pilot In Command (PIC)

The petitioners asserts because the UAs are remotely controlled, operate within a secured area, and do not carry pilots or passengers, and because operations are planned and coordinated in advance, the level of risk associated with their proposed operations is significantly lower than that associated with commercial operations of conventional aircraft. The petitioner asserts a level of safety equivalent to that provided by the pilot certification requirements of § 61.113(a) and (b) can be achieved by requiring pilots to complete a UAS flight training course. The petitioner states the proposed course is 100 hours in duration and is outlined in section F of the Manual.

UAS Operating Parameters

The petitioner states all operations will be conducted in accordance with the Manual and local public safety requirements. The petitioner further states all flight operations will be conducted within visual line of sight (VLOS) of the pilot, in controlled environments at least 5 miles from an airport and at least 3 miles from any city or densely populated area, and at an altitude of 200 feet above ground level (AGL), never exceeding 400 feet AGL. Operations will be limited to confined sterile areas within security perimeters as defined in the Manual. The petitioner will provide notification to the local Flight Standards District Office (FSDO) and airport controller in of all operations within five miles of an airport. The petitioner states a daily briefing regarding planned operations will take place, with mandatory attendance by all personnel who will be performing duties within the safety perimeter. In addition, all onsite personnel must consent to UA flyovers by signing a waiver, with an additional requirement to obtain verbal or written consent from any individual allowed within 100 feet of the operation. The petitioner emphasizes that the use of sUAS on Clayco construction sites reduces the risk

of worker injury because of the aircraft's ability to inspect, photograph, and collect data in challenging areas. Because of these factors, the petitioner asserts that sUAS operations will result in a significant safety increase for personnel and the general public compared to the use of ground-based inspection methods, helicopters, and small aircraft.

The petitioner states it may need an exemption from § 91.7(a) because its sUAS do not have airworthiness certificates. Consequently, there is no applicable regulatory standard available to determine airworthiness. The petitioner asserts an equivalent level of safety will be provided through adherence to maintenance and safety checklist usage standards prescribed by sections B and G of the Manual.

The petitioner notes that given the size, configuration, and unmanned nature of the UA, it is impossible to carry a flight manual on board the aircraft. Additionally, because of the same limiting factors, there is no ability to carry certification and registration documents, or display them on the UA. Therefore, the petitioner requests an exemption from §§ 91.9(b)(2) and 91.203(a) and (b). The petitioner states an equivalent level of safety will be provided by storing the flight manual and applicable certification and registration documents at the ground control point where the sUAS pilot will have immediate access to them.

The petitioner explains it requires an exemption from § 91.103 because preflight actions for sUAS vary from those outlined by the regulation. The Manual requires the pilot to take preflight actions prescribed by the Preflight Checklist that include an analysis of weather conditions, checking flight battery requirements, and an assessment of takeoff and landing distances. The petitioner asserts that these actions will provide an equivalent level of safety.

The petitioner requests an exemption from the requirement to have fully functional dual controls in aircraft used for flight instruction, prescribed by § 91.109. The petitioner explains that, by design, sUAS do not have fully functional dual controls, and are controlled instead through the use of a control box that uses radio communications for aircraft control. The petitioner argues that an equivalent level of safety is provided because the aircraft are unmanned, can be controlled remotely, are relatively small, and operate at slower speeds than the aircraft envisioned by the regulation.

The petitioner details the need for an exemption from § 91.119, which outlines minimum safe altitudes for aircraft. The petitioner specifically emphasizes paragraph (d) of this regulation, which allows helicopters to be operated at lower minimums provided operations are conducted along certain routes at specific altitudes prescribed by the FAA for helicopter operations. The petitioner asserts that its UA are similar to helicopters in flight characteristics, noting their vertical takeoff and landing abilities. The petitioner also emphasizes that the aircraft will never operate outside of a restricted area with a security perimeter, and that all individuals and buildings exposed to their operation will be required to consent to the operation beforehand. Advance notice will be provided to the property owner, local officials, and onsite personnel in accordance with the provisions of the Manual. Additionally, the petitioner states that the low-altitude nature of their operations will ensure separation with conventional aircraft complying with § 91.119. The petitioner asserts an equivalent level of safety will be achieved because of the limited size, weight, speed, and

operation location of the sUAS compared to flight operations with larger aircraft and/or rotorcraft.

The petitioner notes it may require an exemption from the requirements of § 91.121, as its sUAS may have GPS altitude read-outs instead of barometric altimeters. The petitioner states the read-out will be verified by the operator prior to flight by comparing it to the launch site altitude in accordance with the Manual and Safety Checklist. The petitioner asserts these procedures will result in an equivalent level of safety.

The petitioner states its UA are battery powered and are limited to approximately 35 minutes of powered flight. As a result, the petitioner requests an exemption from § 91.151(a). The petitioner explains that mandating a 30 minute fuel reserve would effectively limit its operations to 5 minutes of flight time, negatively impacting efficiency and utility. Additionally, because of the limited area of operation, size, and speed of the UA, as well as the fact that all individuals within the controlled area have signed waivers, the level of risk does not rise to the level that the regulation is intended to mitigate. The petitioner also notes similarities between its operations and exemptions granted to other parties. The petitioner asserts that an equivalent level of safety can be provided by limiting flights to 30 minutes, or enough battery reserve to ensure that the UA lands at the ground station with at least 20 percent of battery power (as determined by the onboard monitoring system and the pilot), whichever occurs first.

Public Interest

The petitioner states that, given the small size of the UA involved and the restricted sterile operating environment, its proposed operation "falls squarely within that zone of safety (an equivalent level of safety) in which Congress envisioned that the FAA must, by exemption, allow commercial operations of sUAS to commence immediately." Also because of the size of the UA and the restricted areas in which they will operate, approval of the application presents no national security issue. The petitioner argues that, given the clear direction in Public Law 112–95 § 333, the strong equivalent level of safety surrounding the proposed operations, and the significant public benefit, including enhanced safety and reduction in environmental impacts, granting the requested exemptions is in the public interest.

Discussion of Public Comments:

A summary of the petition was published in the Federal Register on August 18, 2014 (79 FR 48818). The FAA received 3 comments regarding the notice of petition for exemption.

Of the three comments, one expressed support of the petition, one was opposed, and one was neutral but raised issues and concerns. The Air Line Pilots Association, International (ALPA) submitted comments in opposition to the petition. The National Agricultural Aviation Association (NAAA) expressed various issues and concerns regarding the petition. The Small UAV Coalition submitted a comment in favor of the petition.

The Small UAV Coalition (hereafter the Coalition) outlined its members' support for advancing regulatory and policy changes permitting operation of sUAVs for commercial, recreational, and philanthropic purposes. In support of Clayco's petition, the Coalition states that the petitioner has proposed to abide by stronger safety measures than required, and that

the sUAS in question pose a considerably lower safety risk than larger UAVs used for defense and other aerospace purposes. The Coalition asserts the petitioner "demonstrates that its small UAS operations can be conducted safely on privately owned or controlled property, with a number of voluntary safety precautions."

The Coalition describes the aircraft's characteristics and various safety measures detailed in the petition, including the limited weight of the aircraft, secured operations area, and pilot training procedures. The Coalition emphasizes that Clayco will not conduct operations within 5 miles of an airport, and will have informed consent from all persons in the vicinity of operations, opining that the FAA should grant Clayco's petition in advance of a small UAV rulemaking.

The Coalition notes that pilot certification requirements for manned aircraft are unnecessary and inappropriate for operators of small UA. It asserts that Clayco's proposed training program will result in an equivalent level of safety.

ALPA expressed concern regarding several aspects of Clayco's petition. ALPA states that the petitioner's reference to operations conducted within a "sterile area" is not defined in publicly available materials, nor does Clayco publicly detail procedures for controlling the airspace or area of operation. Specifically, ALPA states "there must be means both to ensure the UA remains within the defined airspace and to ensure that the hazard of other aircraft intruding on the operation is mitigated."

ALPA also shared its belief that the petitioner's proposed operations are for "compensation or hire," and ALPA believes that 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, a current second class FAA medical certificate should be required for a UAS pilot operating an aircraft for compensation or hire commercial operations as is required in the National Airspace System (NAS) today. 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 sUAS operators. Holding a commercial certificate holds sUAS 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.

ALPA cites the petitioner's statement that the aircraft "may not have a barometric altimeter", and asserts that the ability to accurately maintain altitude must be addressed.

ALPA also commented on the petitioner's claims related to the sUAS' ability to return to a safe landing area in the event of certain failures or malfunctions. ALPA states 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. ALPA doubts the ability of the petitioner's aircraft to perform in such a manner in the event of a GPS failure.

NAAA stated that it represents the interests of small business owners and pilots licensed as commercial applicators. NAAA 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 believes that UA operations at low altitudes will increase the potential of collision hazards with agricultural aircraft. NAAA proposes sUAS aircraft be painted a color that is highly visible, be equipped with strobe lights, and use Automatic Dependent Surveillance-Broadcast (ADS-B) or other similar location reporting technology. Similarly, ALPA expressed concern regarding the ability of the operator to comply with the see-and-avoid concept of § 91.113, stating that no method of compliance was specified by the petitioner.

The FAA's analysis is as follows:

Unmanned aircraft system (UAS)

The petitioner requested relief from 14 CFR part 21, Certification procedures for products and parts. In accordance with the statutory criteria provided in Section 333 of P.L. 112-95 in reference to 49 USC § 44704, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that the requested relief from 14 CFR part 21, and any associated noise certification and testing requirements of part 36, is not necessary.

Manned helicopters conducting aerial filming can weigh 6,000 lbs. or more and are operated by an onboard pilot, in addition to other onboard crewmembers, as necessary. The petitioner's UA will weigh less than 10 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. The risk to an onboard pilot and crew during an incident or accident is eliminated with the use of a UA for the aerial filming operation.

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

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 notice to airmen (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 "experimental" will be required as a condition of a grant of exemption. However, this marking is reserved for aircraft that are issued experimental certificates under 14 CFR 21.191. The petitioner's UAS will not be certificated under § 21.191, and therefore the "experimental" marking is not required. Since the petitioner's UAS will not be certificated under § 21.191, a grant of exemption for § 45.23(b) is not necessary.

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)(2) *Inspections*, and 91.417(a) and (b) *Maintenance records*, the FAA has determined that relief from § 91.409(a)(1) is also necessary because it is an alternate inspection requirement of § 91.409(a)(2). 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 Skycatch UAS Flight Manual contain daily, preflight, monthly and yearly checks for the UAS. The FAA finds that adherence to the Skycatch Flight Manual, as required by the conditions and limitations below, is sufficient to ensure that safety is not adversely affected. In accordance with the petitioner's UAS maintenance, inspection, and recordkeeping requirements, the FAA finds that exemption from 14 CFR 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b) is warranted subject to the conditions and limitations below.

Pilot In Command of the UAS

Regarding the petitioner's requested relief from 14 CFR 61.113(a) and (b) *Private pilot privileges and limitations*, Clayco requested regulatory relief to operate its UAS without an FAA-certificated pilot. Although Section 333 provides limited statutory flexibility relative to 49 USC § 44704 for the purposes of airworthiness certification, it does not provide flexibility relative to other sections of 49 USC. The FAA does not possess the authority to exempt from the statutory requirement to hold an airman certificate, as prescribed in 49 USC § 44711. For further information see Exemption No. 11110, Trimble Navigation, Ltd.
Unlike operations pursuant to public COAs, the FAA is requiring a pilot certificate for UAS operations for two reasons, the first of which is to satisfy the statutory requirements as stated above. The second is because pilots holding an FAA issued private or commercial pilot certificate are subject to the security screening by the Department of Homeland Security that certificated airmen undergo. As previously determined by the Secretary, the requirement to have an airman certificate ameliorates security concerns over civil UAS operations conducted in accordance with Section 333.

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

Under current regulations, civil operations for compensation or hire require a PIC holding a commercial pilot certificate per 14 CFR part 61. Based on the private pilot limitations in accordance with 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.

Clayco's petition received two comments registering concern about pilot certification. ALPA stated its opposition to Clayco's proposed operation by a non-certificated pilot without a required medical certificate and believes the operation should be conducted by a PIC holding a current FAA commercial pilot certificate with an appropriate category and class rating for the type of aircraft being flown and a current second-class airman medical certificate. NAAA stated that "the operator should hold a pilot certificate and be thoroughly familiar with the limitations of manned aircraft flight."

The FAA has analyzed Clayco's proposed operation and has determined that it does not differ significantly from the situation described in Grant of Exemption No. 11062 (Astraeus Aerial). Clayco plans to operate over private property with controlled access in the NAS. Given: 1) the similar nature of Clayco'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 Clayco's specific 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 (item #3 stated above), Clayco has proposed a 100 hour training program and 6 month currency requirements. The conditions and limitations below stipulate that Clayco may not permit any PIC to operate unless that PIC has demonstrated through Clayco'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 Clayco'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.

In its discussion of 14 CFR § 45.23(b), Clayco has indicated it will supplement its proposed operation(s) with a visual observer (VO). The FAA also received a comment regarding the appropriate level of medical certification for the VO, asserting that the VO's responsibilities necessitate a third-class airman medical certificate. In Grant of Exemption No. 11062, the FAA agreed with the petitioner's proposed use of a VO and required a VO to be used in all UAS operations; however, the FAA considers the PIC's ability to maintain VLOS with the UAS to be of primary significance and thus the medical certification requirement falls on the PIC. In accordance with regulations, a third-class airman medical certificate is the appropriate level of certificate to exercise the privileges of a private pilot certificate. There are no regulatory requirements for visual observer medical certificates. Although a medical certificate is not required for a VO the UA must never be operated beyond the actual visual capabilities of the VO, and the VO and PIC must have the ability to maintain VLOS with the UA at all times. It is the responsibility of the PIC to be aware of the VO's visual limitations and limit operations of the UA to distances within the visual capabilities of both the PIC and VO. Moreover, the VO will not be operating the aircraft. Therefore, as in Grant of Exemption No. 11062, the FAA does not consider a medical certificate necessary for the VO and the requirement for a VO is included in the conditions and limitations below.

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.

Operating parameters of the UAS

Regarding the petitioner's requested relief from 14 CFR 91.7(a) *Civil aircraft airworthiness*, Clayco's request is based on its belief that "no FAA regulatory standard will exist for determining airworthiness," of the Skycatch UAS. It claims an equivalent level of safety will be provided, "given the size of the aircraft and the requirements contained in the Manual for maintenance and use of safety checklists prior to each flight, as set forth in the Section B and Section G." While the 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 Flight Manual (hereinafter referred to as the operator's manual) to be sufficient means for determining an airworthy condition in accordance with § 91.7(a). 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 manuals and checklists identified above – prior to every flight.

Additionally, in accordance 14 CFR 91.7(b), the PIC of the UAS is responsible for determining whether the aircraft is in a condition for safe flight. Although the petitioner did not seek relief from § 91.7(b) in their petition, the FAA, as in grant of Exemption No. 11062 to Astraeus, has determined that the operator's manual include procedures to be used prior to each flight that can ensure compliance with § 91.7(b). Therefore, relief from § 91.7(b) is not necessary. The petitioner is still required to ensure that its aircraft is in a condition for safe flight – based on compliance with the operator's manual – prior to every flight.

The petitioner requested relief from 14 CFR 91.9(b)(2) *Civil aircraft flight manual, marking, and placard requirements* and 14 CFR 91.203(a) and (b) *Civil aircraft: Certifications required*. Based on the FAA Memorandum "Interpretation regarding whether certain required documents may be kept at an UA's control station," dated August 8, 2014, the requested relief from §§ 91.9(b)(2) and 91.203(a) and (b) is not necessary.

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 operator's manual. 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 operator's manual address the FAA's concerns regarding compliance with § 91.103(b). The PIC will take all actions including reviewing weather, flight battery requirements, landings, and takeoff distances and aircraft performance data before initiation of flight. The FAA has imposed stricter requirements with regard to visibility and distance from clouds; this is to both keep the UA from departing the VLOS and to preclude the UA from operating in the NAS. The FAA also notes the risks associated with sun glare; the FAA believes the that 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 their preflight procedures. Therefore, the FAA finds that exemption for 14 CFR 91.103 is not necessary.

Regarding the petitioner's requested relief from 14 CFR 91.109(a) *Flight instruction; Simulated instrument flight and certain flight tests*, the petitioner did not describe training scenarios in which a dual set of controls would be utilized or required, i.e. dual flight instruction, provided by a flight instructor or other company-designated individual, that would require that individual to have fully functioning dual controls. Rather, Clayco accomplishes training through the procedures referenced in the operator's manual. Furthermore, the FAA is requiring that the UAS PIC's possess at least a private pilot's certificate. The currency requirements expressed in the conditions and limitations below ensure that a PIC training on the Skycatch has the authority to operate the UAS during training flights as PIC in accordance with § 61.31(*l*). The FAA will impose a limitation that those training operations are only conducted during dedicated training sessions. As such, the FAA finds that the petitioner can conduct its operations without the requested relief from § 91.109.

Regarding the petitioner's requested relief from 14 CFR 91.119, *Minimum safe altitudes*, the petitioner failed to specify the part(s) of 14 CFR 91.119 from which they require relief. Relief from 14 CFR 91.119(a), which requires operating at an altitude that allows a safe emergency landing if a power unit fails, is unprecedented and unwarranted. Relief from 14 CFR 91.119(b), operation over congested areas, is not applicable, because the petitioner states that operations will only be conducted within the sterile area described in the operator's manual.

The petitioner proposes to operate the UA within 100 feet of certain persons directly involved in the construction activity however; they failed to provide an explanation for exposing those 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 10 pounds or less. If barriers or structures are present that can sufficiently protect nonparticipating persons from 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.

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 400 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 GPS equipment installed onboard the aircraft. 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,* Clayco believes that an exemption from 14 CFR § 91.151(a) is safe and does not engender the type of risks that Section § 91.151(a) was meant to prevent given the size and speed at which the UAS operates. 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. Prior relief has been granted for manned aircraft to operate at less than the minimums prescribed in § 91.151 (a), including Exemption Nos. 2689, 5745, and 10650. In addition, similar UAS-specific relief has been granted an Exemption Nos. 8811, 10808, and 10673 for daytime, Visual Flight Rules (VFR) conditions. The Skycatch provides a battery failsafe that commands the UA's return to the launch point when critical minimum voltage is reached. The UAS batteries provide approximately 35 minutes of powered flight. The FAA agrees with Clayco's proposal to limit UAS flights to not more than 30 minutes, or enough battery reserve to ensure that the sUAS lands at the ground station with at least 20% battery reserve power, whichever happens first. 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. 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 Certificate of Waiver or Authorization (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 Notice to Airman (NOTAM), which is the mechanism for alerting other users of the NAS to the UAS activities being conducted. Therefore, the FAA believes that adherence to this process is the safest and most expeditious way to permit Clayco to conduct their proposed UAS operations. The conditions and limitations below prescribe the requirement for Clayco to obtain an ATO-issued COA.

Public Interest

The FAA finds that a grant of exemption is in the public interest. The enhanced safety and reduced environmental impact 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 aerial imagery industry, adding a greater degree of flexibility, which supplements the current capabilities offered by manned aircraft.

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

Relief sought by petitioner (14 CFR)	**FAA determination (14 CFR)**
Part 21	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
91.9(b)(2)	Relief not necessary
91.103	Relief not necessary
91.109	Relief not necessary
91.119	Relief from paragraph (c) granted with conditions and limitations
91.121	Relief granted with conditions and

Relief sought by petitioner (14 CFR)	FAA determination (14 CFR)
	limitations
91.151(a)	Relief granted from 91.151(a)(1): day, with conditions and limitations
91.203(a) and (b)	Relief not necessary
91.405(a)	Relief granted with conditions and limitations
91.407(a)(1)	Relief granted with conditions and limitations
91.409(a)(2)	Relief granted with conditions and limitations; relief from 91.409(a)(1) also 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, Clayco, Inc., is granted an exemption from 14 CFR 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) to the extent necessary to allow Clayco, Inc. to operate unmanned aircraft systems (UAS) for the purpose of aerial imaging. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

Relative to this grant of exemption, Clayco, Inc. is hereafter referred to as the operator.

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.

The Clayco Skycatch Flight Manual is hereafter referred to as the operator's 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 are limited to the following aircraft described in the operator's manual which is a quad rotor aircraft weighing less than 10 pounds: Skycatch Unmanned Aircraft System. Proposed operations of any other aircraft will require a new petition or a petition to amend this grant.

2) The UA may not be flown at an indicated airspeed exceeding 43.4 knots.

3) The UA must be operated at an altitude of no more than 400 feet above ground level (AGL), as indicated by the procedures specified in the operator's manual. All altitudes reported to ATC must be in feet AGL.

4) The UA must be operated within visual line of sight (VLOS) of the PIC at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate.

5) All operations must utilize a visual observer (VO). The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight.

6) Provided the additional requirements identified in these conditions and limitations are added or amended, the operator's manual is considered acceptable to the FAA. The operator's manual and this grant of exemption must be maintained and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operator's manual, the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operator's manual.
The operator may update or revise its operator's manual. 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 operator's manual.

7) Prior to each flight the PIC must inspect the UAS to ensure it is in a condition for safe flight. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight. The Ground Control Station must be included in the preflight inspection. All maintenance and alterations must be properly documented in the aircraft records.

8) Any UAS 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 operator's manual. 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 operator's manual.

9) The preflight inspection section in the operator's manual must be amended to include the following requirement: 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 operator's manual.

10) 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.

11) Clayco must carry out their maintenance, inspections, and record keeping requirements, in accordance with the operator's manual. 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.

12) Clayco UAS technicians must receive and document training referenced in the operator's manual.

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

14) Clayco maintenance personnel must make a record entry in the UAS logbook or equivalent document of the corrective action taken against discrepancies discovered between inspections.

15) 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.

16) The operator may not permit any PIC to operate unless that PIC has demonstrated through Clayco'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.

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.

18) 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. The UA may not operate within 3 nautical miles from any city or densely populated area.

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 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 operator's manual.

21) The PIC must abort the flight in the event of unpredicted obstacles or emergencies in accordance with the operator's manual.

22) 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 first point of intended landing prior to utilizing battery reserve power.

23) The operator must obtain an Air Traffic Organization (ATO) issued Certificate of Waiver or Authorization (COA) prior to conducting any operations under this grant of exemption. This COA will also require the operator to request a Notice to Airman (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to the operation.

24) All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification (N-Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.

25) Before conducting operations, the radio frequency spectrum used for operation and control of the UA must comply with the Federal Communications Commission (FCC) or other appropriate government oversight agency requirements.

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

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

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

29) The UA may not be operated over congested or densely populated areas. These areas include but are not limited to the yellow areas depicted on World Aeronautical Charts (WAC), Sectional Aeronautical Charts (Sectionals), or Terminal Area Charts (TAC). However, aeronautical charts may not reflect pertinent local information. Ultimately, it

is the PIC's responsibility to maintain the minimum safe altitudes required by § 91.119.

30) 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 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).

31) All operations shall be conducted over private or controlled-access property with permission from the land owner/controller or authorized representative. Permission from land owner/controller or authorized representative will be obtained prior to the beginning of every flight.

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

Unless otherwise specified in this grant of exemption, the UAS, the UAS PIC, and the UAS operations must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 61, and 91.

This exemption terminates on December 31, 2016, unless sooner superseded or rescinded.

Issued in Washington, DC, on December 10, 2014.

/s/

John S. Duncan

Director, Flight Standards Service