



U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

September 25, 2015

Exemption No. 12984
Regulatory Docket No. FAA-2015-2816

Mr. Robert E. Adams
Carolina Aerial Imaging
124 Moontide Court
Lexington, SC 29072

Dear Mr. Adams:

This letter is to inform you that we have granted your request for exemption. It transmits our decision, explains its basis, and gives you the conditions and limitations of the exemption, including the date it ends.

By letter dated June 8, 2015, you petitioned the Federal Aviation Administration (FAA) for an exemption. You requested to operate an unmanned aircraft system (UAS) to conduct aerial videography and photography.

See Appendix A for the petition submitted to the FAA describing the proposed operations and the regulations that the petitioner seeks an exemption.

The FAA has determined that good cause exists for not publishing a summary of the petition in the Federal Register because the requested exemption would not set a precedent, and any delay in acting on this petition would be detrimental to the petitioner.

Airworthiness Certification

The UAS proposed by the petitioner are the 3D Robotics Solo and the DJI Inspire.

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*. In accordance with the statutory criteria provided in Section 333 of Public Law 112-95 in reference to 49 U.S.C. § 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, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*, and any associated noise certification and testing requirements of part 36, is not necessary.

The Basis for Our Decision

You have requested to use a UAS for aerial data collection¹. The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grants of Exemption Nos. 11062 to Astraeus Aerial (*see* Docket No. FAA–2014–0352), 11109 to Clayco, Inc. (*see* Docket No. FAA–2014–0507), 11112 to VDOS Global, LLC (*see* Docket No. FAA–2014–0382), and 11213 to Aeryon Labs, Inc. (*see* Docket No. FAA–2014–0642), the FAA found that the enhanced safety achieved using an unmanned aircraft (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.

Having reviewed your reasons for requesting an exemption, I find that—

- They are similar in all material respects to relief previously requested in Grant of Exemption Nos. 11062, 11109, 11112, and 11213;
- The reasons stated by the FAA for granting Exemption Nos. 11062, 11109, 11112, and 11213 also apply to the situation you present; and
- A grant of exemption is in the public interest.

Our 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, Mr. Robert E. Adams is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 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 to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, Mr. Robert E. Adams is hereafter referred to as the operator.

¹ Aerial data collection includes any remote sensing and measuring by an instrument(s) aboard the UA. Examples include imagery (photography, video, infrared, etc.), electronic measurement (precision surveying, RF analysis, etc.), chemical measurement (particulate measurement, etc.), or any other gathering of data by instruments aboard the UA.

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 3D Robotics Solo and the DJI Inspire when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.
2. Operations for the purpose of closed-set motion picture and television filming are not permitted.
3. The UA may not be operated at a speed exceeding 87 knots (100 miles per hour). The exemption holder may use either groundspeed or calibrated airspeed to determine compliance with the 87 knot speed restriction. In no case will the UA be operated at airspeeds greater than the maximum UA operating airspeed recommended by the aircraft manufacturer.
4. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL). Altitude must be reported 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 or U.S. driver's license.
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 duties required of the VO.
7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The operating documents 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 or any law enforcement official upon request. The operator must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption. If the operator determines that any update or revision would affect the basis upon which the FAA granted this exemption, then the operator must petition for an amendment to its grant of exemption. The FAA's UAS Integration Office (AFS-80) may be contacted if questions arise regarding updates or revisions to the operating documents.

8. 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 prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.
9. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.
10. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the UAS is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, e.g., inoperable components, items, or equipment. 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.
11. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the aircraft and aircraft components.
12. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.
13. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal government. 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.
14. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. PIC

qualification flight hours and currency must be logged in a manner consistent with 14 CFR § 61.51(b). Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building) and determining the PIC's ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption are permitted under the terms of this exemption. However, training operations may only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights, all persons not essential for flight operations are considered nonparticipants, and the PIC must operate the UA with appropriate distance from nonparticipants in accordance with 14 CFR § 91.119.

15. 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.
16. The UA may not operate within 5 nautical miles of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD) or for airports not denoted with an ARP, the center of the airport symbol as denoted on the current FAA-published aeronautical chart, unless a letter of agreement with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.
17. 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.
18. 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.
19. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.
20. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UA to conduct the intended operation and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater.
21. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.
22. 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.

23. Documents used by the operator to ensure the safe operation and flight of the UAS and any 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.
24. The UA must remain clear and give way to all manned aviation operations and activities at all times.
25. The UAS may not be operated by the PIC from any moving device or vehicle.
26. All Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:
 - a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner ensuring the safety of nonparticipating persons; and
 - b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

The PIC, VO, operator trainees or essential persons are not considered nonparticipating persons under this exemption.

27. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.
28. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS-80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.nts.gov.

If this exemption permits operations for the purpose of closed-set motion picture and television filming and production, the following additional conditions and limitations apply.

29. The operator must have a motion picture and television operations manual (MPTOM) as documented in this grant of exemption.

30. At least 3 days before aerial filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local Flight Standards District Office (FSDO) with jurisdiction over the area of proposed filming. The 3-day notification may be waived with the concurrence of the FSDO. The plan of activities must include at least the following:
- a. Dates and times for all flights;
 - b. Name and phone number of the operator for the UAS aerial filming conducted under this grant of exemption;
 - c. Name and phone number of the person responsible for the on-scene operation of the UAS;
 - d. Make, model, and serial or N-Number of UAS to be used;
 - e. Name and certificate number of UAS PICs involved in the aerial filming;
 - f. A statement that the operator has obtained permission from property owners and/or local officials to conduct the filming production event; the list of those who gave permission must be made available to the inspector upon request;
 - g. Signature of exemption holder or representative; and
 - h. A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which filming will be conducted and the altitudes essential to accomplish the operation.
31. Flight operations may be conducted closer than 500 feet from participating persons consenting to be involved and necessary for the filming production, as specified in the exemption holder's MPTOM.

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 September 30, 2017, unless sooner superseded or rescinded.

Sincerely,

/s/

John S. Duncan

Director, Flight Standards Service

Enclosures

Robert E. Adams
Carolina Aerial Imaging
124 Moontide Court
Lexington, SC 29072

June 8th, 2015

U.S. Department of Transportation
Docket Management System
1200 New Jersey Ave.
SE Washington DC 20590

Re: Exemption Request Pursuant to Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations from: 14 CFR 21 subpart H; 14 CFR 45.23(b); 14 CFR 61.113(a); 14 CFR 91.7(a); 14 CFR 91.9(b)(2); 14 CFR 91.103; 14 CFR 91.109; 14 CFR 91.119(c); 14 CFR 91.121; 14 CFR 91.151(a); 14 CFR 91.203 (a) and (b); 14 CFR 91.405 (a); 14 CFR 91.407 (a) (1) 14 CFR 91.409 (a)(1) and (2); 14 CFR 91.417(a) and (b)

To whom it may concern: Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 and 14 CFR Part 11, Robert E. Adams, operator of small Unmanned Aerial Systems (UAS), hereby applies for an exemption from the listed Federal Aviation Regulations to allow commercial operation of a small UAS, so long as such operations are conducted within and under the conditions outlined herein or as may be established by the FAA as required by Section 333.

Commercial operation small UAS, as described herein, which are equipped with cameras and sensors, would operate in the following manner:

1. Aerial photography and/or video for public and/or private use including real estate, architecture, land surveying, engineering and other related professional activities.
2. Aerial video and/or photography for public and/or private use including television, public events, and cinematography.
3. Aerial inspection/photography of residential/commercial structures under contract with the owners or local government authority.
4. Aerial video/photography or providing live video feed to assist with search and rescue operations in cases of an emergency or natural disaster only when the local authorities or government has requested it by contract or donation.
5. Aerial video/photography for agriculture activities.

As described fully below, the requested exemption would permit the operation of small UAS under controlled conditions in the NAS that would be a) limited b) controlled c) predetermined and d) will provide safety enhancements to the already safe operations in the industry presently using conventional aircraft. Approval of this exemption would thereby enhance safety and fulfill the Secretary of

Transportation's (the FAA Administrator's) responsibilities to "....establish requirements for the safe operation of such aircraft systems in the national airspace system."

The name, phone, email and address of the applicant:

Name: Robert E. Adams

Phone: (864)993-7469

Email: reahr51@gmail.com

Address: 124 Moontide Ct, Lexington, SC 29072

USA Regulations from which the exemption is requested: 14 CFR Part 21 subpart H 14 CFR 45.23 (b) 14 CFR 61.113(a) 14 CFR 91.7 (a) 14 CFR 91.9 (b) (2) 14 CFR 91.103 14 CFR 91.109 14 CFR 91.119(c) 14 CFR 91.121 14 CFR 91.151 (a) 14 CFR 91.203 (a) & (b) 14 CFR 91.405 (a) 14 CFR 91.407 (a) (1) 14 CFR 91.409 (a) (2) 14 CFR 91.417 (a) & (b)

The small UAS's I will be using are multi-rotor craft weighing no more than 55lbs. including payload. Under normal conditions they operate at speeds of no more than 100 Mph or 87 Knots and have the ability hover and move along a vertical and horizontal plane simultaneously. They will operate in line of sight only and by the exempted person only obeying all other local and federal laws.

Given the small size of the small UAS and the controlled environment provided the proposed operations will adhere to the Reform Act's safety requirements. The approval of this application presents no national security issues. Regarding the level of safety surrounding the proposed operations and the public benefit, reduction in environmental impacts, including but not limited to reduced emissions and noise, the grant of the requested exemption is in the public interest. Accordingly the applicant requests that the FAA grant the requested exemption with minimum delay.

AIRCRAFT AND EQUIVALENT LEVEL OF SAFETY

The operation limitations proposed for an equivalent or higher level of safety because operations will further enhance the safety of the persons and/or property using conventional aircraft. These limitations and conditions to which the applicant agrees to adhere to when conducting commercial operations under the FAA issued exemption as set forth in the Flight Operations Manual (FOM) include:

1. The small UAS will weigh less than 55 lbs.
2. Flights will be operated within line of sight of a pilot and/or observer.
3. Maximum flight time for each operational flight will be 30 minutes. Flights will be terminated at 25% battery power reserve
4. Flights will be operated at an altitude of no more than 400 feet Above Ground Level (AGL) and not more than 200 feet above an elevated platform from which filming is planned.
5. Minimum crew for each operation will consist of the small UAS Pilot in Command (PIC), the Visual Observer (VO) when needed and may include but not limited to a Camera Operator.
6. The small UAS pilot will be Ryan R. Smith ONLY not allowing any other person to operate the small UAS in a commercial capacity.

7. A briefing will be performed regarding the planned small UAS operations prior to each day's flight consisting of all the days' production activities.
8. The PIC will obtain verbal/written consent of all persons involved with the planned operation and ensure that only consenting persons will be allowed within 100 feet of the flight operation, and the radius may be reduced to 30 feet based upon an equivalent level of safety determination, as required under the FOM. With the advanced permission or direction of the FSDO, operations at closer range may be approved.
9. The PIC and VO will have been trained in operation of small UAS and receive up-to-date information for the particular small UAS to be operated and will be able to show upon request their competent ability to operate the small UAS and/or Camera.
10. The PIC and VO will be able to communicate by voice, radio, and/or text at all times.
11. Written and/or verbal permission and permits will be obtained from territorial, state, county or city jurisdictions, including law enforcement, fire or other appropriate governmental agencies when needed.
12. If the small UAS loses communications or loses GPS signal, the small UAS will have the capability to return to a pre-determined location within a designated location and land autonomously.
13. The small UAS will have the capability to abort a flight in case of unpredicted obstacles, weather, or emergencies.

14 C.F.R. Part 21, Subpart H: Airworthiness Certificates 14 C.F.R. §91.203 (a) (1)

Subpart H, entitled Airworthiness Certificates, establishes the procedural requirements for the issuance of airworthiness certificates as required by FAR §91.203 (a) (1). Given the size and limited operating area associated with the aircraft to be utilized by the Applicant, an exemption from Part 21 Subpart H meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the Reform Act. The Federal Aviation Act (49 U.S.C. §44701 (f)) and Section 333 of the Reform Act both authorize the FAA to exempt aircraft from the requirement for an airworthiness certificate, upon consideration of the size, weight, speed, operational capability, and proximity to airports and populated areas of the particular small UAS. In all cases, an analysis of these criteria demonstrates that the small UAS 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 rotorcraft) operating with an airworthiness certificate without the restrictions and conditions proposed.

The small UAS to be operated hereunder is less than 55 lbs. fully loaded, carries neither a pilot nor passenger, carries no explosive materials or flammable liquid fuels, and operates exclusively within a secured and designated area. Unlike other civil aircraft, operations under this exemption will be tightly controlled and monitored by both the operator and under the requirements and in compliance with local public safety requirements. These safety enhancements provide a greater degree of safety to the public and property owners than conventional operations conducted with airworthiness certificates issued under 14 C.F.R. Part 21, Subpart H. Lastly, application of these same criteria demonstrates that there is no credible threat to national security posed by the small UAS, due to its size, speed of

operation, location of operation, lack of explosive materials or flammable liquid fuels, and inability to carry a substantial external load.

14 C.F.R. § 45.23 (b). Marking of the Aircraft

The regulation requires: 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.

Even though the small UAS will have no airworthiness certificate, an exemption may be needed as the small UAS will have no entrance to the cabin, cockpit or pilot station on which the word "Experimental" can be placed. Given the size of the small UAS, two-inch lettering will be impossible. The word "Experimental" will be placed on the fuselage in compliance with §45.29 (f). The equivalent level of safety will be provided by having the small UAS marked on its fuselage as required by §45.29 (f) where the pilot, observer and others working with the small UAS will see the identification of the small UAS as "Experimental."

14 C.F.R. § 61.113(a): Private Pilot Privileges and Limitations: Pilot in Command.

Pursuant to 14 CFR 61.113 (a), no person who holds a private pilot certificate may act as a pilot in command of an aircraft that is carrying passengers or property for compensation or hire. Our small UAS do not carry any pilots or passengers nor property therefore I am seeking an exemption to 14 CFR 61.113(a). Although helpful, a pilot's license will not ensure remote control piloting skills. The risks attendant to the operation of small UAS is far less than the risk levels inherent in the commercial activities outlined in 14 CFR 61. I feel the operation and limitations set forth in the FOM will equate to the safe operation of the small UAS.

14 C.F.R. §91.7(a): Civil Aircraft Airworthiness.

The regulation requires that no person may operate a civil aircraft unless it is in airworthy condition. As there will be no airworthiness certificate issued for the aircraft, should this exemption be granted, no FAA regulatory standard will exist for determining airworthiness. Given the size of the aircraft for maintenance and use of safety checklists prior to each flight an equivalent level of safety will be provided.

14 C.F.R. § 91.9 (b) (2): Civil Aircraft Flight Manual in the Aircraft.

Section 91.9 (b) (2) provides: No person may operate a U.S.-registered civil aircraft ... (2) For which an Airplane or Rotorcraft Flight Manual is not required by §21.5 of this chapter, 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. The small UAS, given its size and configuration has no ability or place to carry such a flight manual on the aircraft, not only because there is no pilot on board, but because there is no room or capacity to carry such an item on the aircraft. The equivalent level of safety will be maintained by keeping the flight manual at the ground control point where the pilot flying the small UAS will have immediate access to it.

14 C.F.R. § 91.103: Preflight Action.

This regulation requires each pilot in command to take certain actions before flight to insure the safety of flight. As FAA approved rotorcraft flight manuals will not be provided for the aircraft an exemption will be needed. The OPERATOR will take all actions including reviewing weather, flight battery requirements, landing and takeoff distances and aircraft performance data before initiation of flight.

14 C.F.R. §91.109: Flight Instruction.

Section 91.103 provides 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. Small UAS and remotely piloted aircraft, by their design do not have fully functional dual controls. Flight control is accomplished through the use of a control box that communicates with the aircraft via radio communications. The FAA has approved exemptions for flight training without fully functional dual controls for a number of aircraft and for flight instruction in experimental aircraft. The equivalent level of safety provided by the fact that neither a pilot nor passengers will be carried in the aircraft and by the size and speed of the aircraft.

14 C.F.R. §91.119: Minimum Safe Altitudes.

Section 91.119 establishes safe altitudes for operation of civil aircraft. Section 91.119 (d) allows helicopters to be operated at less than the minimums prescribed, provided the person operating the helicopter complies with any route or altitudes prescribed for helicopters by the FAA. As this exemption is for a small UAS that is a helicopter and the exemption requests authority to operate at altitudes up to 400 AGL, or not more than 200 above an elevated platform from which filming is planned, an exemption may be needed to allow such operations. As set forth herein, the small UAS will never operate at higher than 400 AGL with the exception that in circumstances where the small UAS is used to survey or photograph a structure whose height exceeds 400 feet AGL, the small UAS will not be operated more than 100' above the highest point on the structure. It will however be operated in a restricted area with security perimeter, where buildings and people will not be exposed to operations without their pre-obtained consent. The equivalent level of safety will be achieved given the size, weight, speed of the small UAS as well as the location where it is operated. No flight will be taken without the permission of the property owner or local officials. Because of the advance notice to the property owner and participants in the filming activity, all affected individuals will be aware of the planned flight operations. Compared to flight operations with aircraft or rotorcraft weighting far more than the maximum 55lbs. proposed herein and the lack of flammable fuel, any risk associated with these operations is far less than

those presently presented with conventional aircraft operating at or below 500 AGL. In addition, the low-altitude operations of the small UAS will ensure separation between these small- UAS operations and the operations of conventional aircraft that must comply with Section 91.119.

14 C.F.R. §91.121 Altimeter Settings.

This regulation requires 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." As the small UAS may not have a barometric altimeter, but instead a GPS altitude read out, an exemption may be needed. An equivalent level of safety will be achieved by the operator, pursuant to the safety check list and live flight data monitoring, confirming the altitude of the launch site shown on the GPS altitude indicator before flight.

14 C.F.R. § 91.151(a): Fuel Requirements for Flight in VFR Conditions

Section 91.151 (a) prohibits an individual from beginning "a flight in an airplane under 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." The battery powering the small UAS provides approximately 30 minutes of powered flight. To meet the 30 minute reserve requirement in 14 CFR §91.151, small UAS flights would be limited to approximately 10 minutes in length. Given the limitations on the small UAS's proposed flight area and the location of its proposed operations within a predetermined area, a longer time frame for flight in daylight or twilight VFR conditions is reasonable. Applicant believes that an exemption from 14 CFR §91.151(a) falls within the scope of prior exemptions. Operating the small UAS, in a tightly controlled area where only people and property owners or official representatives who have signed waivers will be allowed, with less than 30 minutes of reserve fuel, does not engender the type of risks that Section 91.151(a) was intended to alleviate given the size and speed of the small UAS. Additionally, limiting small UAS flights to 10 minutes would greatly reduce the utility for which the exemption will be granted. Applicant believes that an equivalent level of safety can be achieved by limiting flights to 30 minutes or 25% of battery power— whichever happens first. This restriction would be more than adequate to return the small UAS to its planned landing zone from anywhere in its limited operating area.

14 C.F.R. §91.203 (a) and (b): Carrying Civil Aircraft Certification and Registration

The regulation provides in pertinent part:

- (a) Except as provided in § 91.715, no person may operate a civil aircraft unless it has within it the following: (1) An appropriate and current airworthiness certificate. . . .
- (b) No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section 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.

The small UAS fully loaded weighs no more than 55 lbs. and is operated without an onboard pilot. As such, there is no ability or place to carry certification and registration documents or to display them on the small UAS.

An equivalent level of safety will be achieved by keeping these documents at the ground control point where the pilot flying the small UAS will have immediate access to them; to the extent they are applicable to the small UAS.

14 C.F.R. §91.405 (a); 407 (a) (1); 409 (a) (2); 417(a) & (b): Maintenance Inspections.

These regulations require that 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 of this chapter...,” and others shall inspect or maintain the aircraft in compliance with Part 43. Given that these section and Part 43 apply only to aircraft with an airworthiness certificate, these sections will not apply to the applicant. Maintenance will be accomplished by the operator pursuant to the flight manual and operating handbook. An equivalent level of safety will be achieved because these small UASs are very limited in size and will carry a small payload and operate only in restricted areas for limited periods of time. If mechanical issues arise the small UAS can land immediately and will be operating from no higher than 400 feet AGL. The operator will ensure that the small UAS is in working order prior to initiating flight, perform required maintenance, and keep a log of any maintenance performed. Moreover, the operator is the person most familiar with the aircraft and best suited to maintain the aircraft in an airworthy condition to provide the equivalent level of safety.

An equivalent level of safety will be achieved because maintenance and inspections will be performed in accordance with the small UAS Manufacturer's Manual, as referenced in the Aircraft Operations Manual (AOM). As provided in the FOM, the operator will ensure that the small UAS is in working order prior to initiating flight and perform required maintenance needed.

Small UAS Information

Small UAS's to be used are as follows but not limited to providing they are within the scope of the exemption granted by the FAA:

1. 3D Robotics Solo
 - a. Weight (Battery & Propellers Included) –3.3 lbs.
 - b. Hover Accuracy (Ready to Fly) – Horizontal: 16 ft
 - c. Max Ascent Speed - 5 ft/s
 - d. Max Descent Speed –2.5 ft/s
 - e. Max Flight Speed –55 ft/s
 - f. 3d Robotics Solo Battery
 - Lithium polymer, 5200 mAh, 14.8 Vdc

g. 3d Robotics Solo Controller 2.4 GHz

- Excerpt from 3d Robotics owner's manual
10.3.1 U.S. - FCC (Federal Communication Commission)
3DR Solo FCC: 2ADYD-S111A
3DR Solo Controller FCC: 2ADYD-AT11A

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by 3D Robotics could void the user's authority to operate the equipment.

Radiation Exposure Statement: The Solo system has been tested to ensure compliance with FCC-mandated limits for general population radio frequency (RF) exposure for an uncontrolled environment. These limits ensure that no harmful effects will result from operating Solo according to the standard operating procedures described in this manual.

The body's Specific Absorption Rate (SAR) for the Solo controller is 1.33 watts per kilogram (W/kg) in compliance with the FCC limit of 1.6 W/kg. To reduce exposure to RF energy, hold Solo at least 20 cm away from your body at all times during operation. Do not operate the Solo controller co-located or in conjunction with any other antenna or transmitter.

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

2. DJI Inspire

- a. Weight (Battery Included) 6.47 lbs.
- b. Hovering Accuracy (GPS Mode) Vertical 1.5 ft, Horizontal 7.5 ft
- c. Max Angular Velocity Pitch: 300deg/s; Yaw ISOdeg/s
- d. Max Tilt Angle 30deg/s
- e. Max Ascent Speed 15 ft/s
- f. Max Decent Speed 12 ft/s
- g. Max Speed 66 ft/s
- h. Diagonal Distance 22.0 in. (Landing gear lowered), 22.9 in. (Landing gear raised) •
- i. DJI Inspire Battery
 - Model (Standard) TB47
 - Voltage 22.2v
 - Capacity 4500mAh

- Energy 99.9Wh
- Net Weight 1.26 lbs.
- DJI Inspire Gimbal
- Operating Current - Station: 750mA, Motion: 900mA
- Controllable Range - Pitch: -90deg to +30deg
- Max Controllable Speed - Pitch: 120deg/s, Pan: 180deg/s

j. DJI Inspire Remote Controller

- Frequency
- 5.725GHz-5.850GHz (Remote Controller to Remote Controller)
- 2.400GHz-2.483GHz (Remote Controller to Aircraft)
- Battery Capacity 6000mAh
- Working Current/Voltage [1.2A@7.4V](#)

Owner's manual Hyperlinks

3dr Solo

http://3drobotics.com/wp-content/uploads/2015/06/Solo_User_Manual_V1.pdf

(Control and Click)

DJI Inspire

http://download.dji-innovations.com/downloads/inspire_1/en/Inspire_1_User_Manual_v1.2_en.pdf

(Control and Click)

Please do not hesitate to reach out to me if you have any questions. I thank you for reviewing my application for a section 333 exemption and I eagerly await your response.

Sincerely,

Eddie Adams

6/8/15