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

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

August 27, 2015

Exemption No. 12641
Regulatory Docket No. FAA−2015−2423

Mr. Kevin Ham
Member
Force 4 Photography, LLC
215 Head of the Bay Road
Buzzards Bay, MA 02532

Dear Mr. Ham:

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 May 18, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Force 4 Photography, LLC (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial photography, videography, inspections, education, and search and rescue operations.

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 DJI Phantom 2 Vision+, DJI Phantom 3 Professional, and DJI Inspire 1.

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 collection[1]. 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, Force 4 Photography, LLC 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.

[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.

Conditions and Limitations

In this grant of exemption, Force 4 Photography, LLC 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.

1. Operations authorized by this grant of exemption are limited to the DJI Phantom 2 Vision+, DJI Phantom 3 Professional, and DJI Inspire 1 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.ntsb.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

May 18th, 2015

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

Exemption Request Pursuant To Section 333 of the FAA Modernization and Reform Act of 2012

Name and Address of Petitioner

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Introduction

As set forth herein, to commercially operate small Unmanned Aircraft Systems (UAS) safely and legally in the National Airspace System (NAS), Kevin Ham of Force 4 Photography, LLC, Buzzards Bay, Massachusetts, seeks an exemption from Federal Aviation Regulations pursuant to 14 C.F.R. and Section 333 of the FAA Modernization and Reform Act of 2012.

Section 333 states that the FAA may issue a certificate of waiver upon a finding that a type of UAS, as a result of its size, weight, speed, operational capacity, proximity to airports and populated areas, and operations within visual line of sight do not create a hazard to users of the NAS or the public or pose a threat to national security. The grant of such an exemption is consistent with Congress' intent, reflected in Section 333, that safe systems be permitted in the national airspace prior to the issuance of final regulations governing general use of these systems.

Being "unmanned aircraft and associated elements, including communication links and the components that control the unmanned aircraft that are required for the pilot in command to operate safely and efficiently in the national airspace system," Force 4 Photography's UAS meet the Section 331 definition of "small unmanned aircraft."

Section 332 provides for such integration of civil unmanned aircraft systems into our national airspace system as it is in the public's interest to do so. We would like to operate our small UAS(s) prior to the time period by which the Reform Act requires the FAA to promulgate rules governing such craft, thereby providing direct experience and valuable information for formal regulation.

Force 4 Photography intends to use small UAS to provide aerial photography and videography services to businesses, organizations and community members. See the PUblic Benefit section of this document for more details. More specifically, we intend to:

- enable businesses to improve marketing and outreach through the use of state-of-the-art aerial photography and videography
- help to inspect buildings and structures, and map landscapes in a safe, cost-effective manner
- provide economic stimulus and public benefit by providing an effective means by which companies or individuals can use up-to-date, high-quality photos and videos to learn about properties, neighborhoods and communities
- help communities realize economic benefit by encouraging public participation and encouraging tourism; by showcasing community buildings and landscapes; and by documenting community events in low-cost ways not previously available to them
- increase awareness/knowledge of the amenities of a local area by the general public and by visiting tourists
- provide non-profit organizations as well as schools and universities and local municipalities ways to showcase facilities, document events, and educate the public
- aid in search and rescue operations and accident investigators.

We understand that we are entitled to submit a Petition for Exemption if we believe that following a rule will burden us, we can provide a level of safety at least equal to that provided by the rule, and our request is in the public interest. Therefore we seek relief from the following sections of the current regulations:

14 CFR 21 subpart H - Certification procedures; Airworthiness Certificates
14 CFR 45.23 - Display of Marks
14 CFR 61.113 (a) & (b) Private Pilot Privileges and Limitations
14 CFR 91.105 Flight crewmembers at stations
14 CFR 91.109 (a) Flight instruction
14 CFR 91.119 (c) Minimum safe altitudes
14 CFR 91.121 - Altimeter settings
14 CFR 91.151 (a) - Fuel Requirements for Flight in VFR Conditions
14 CFR 91.203 Carrying Civil Aircraft Certification and Registration
14 CFR 91.405 (a) 14 CFR 91.407 (a) (1), 14 CFR 91.409 (a) (2) Maintenance required; Operation after maintenance, preventive maintenance, rebuilding or alteration
14 CFR 91.417 (a) & (b) Maintenance Records
14 CFR 91.7 (a) - Civil Aircraft Airworthiness
14 CFR 91.9 (b) Civil aircraft flight manual, marking, and placard requirements.

This application is similar to many which have received FAA approval. As stated in Exemption #11639, the FAA has found that the enhanced safety achieved using an UAS with the specifications described by herein, 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 such exemption is in the public interest. Since we are applying at a time when the FAA is using a "summary grant process" be informed that while developing this request we reviewed, among others, exemptions #11636, #11639, #11595, #11596, #11564, #11569, and #11616.

Extent of Relief and Reason for Seeking Relief; Why the Exemption would not Adversely Affect Safety, or How the Exemption would Provide a Level of Safety Equal to Existing Rule

Part 21 Airworthiness Certification; Subpart H Certification procedures for products and parts, Airworthiness Certificates

This section outlines requirements for the issue of design and production approvals, airworthiness certificates, and other airworthiness approvals. We seek relief from this rule because the size, weight and enclosed operational area of our UAS, as described elsewhere in this document, permit exemption from Part 21 because our UAS meet and exceed an equivalent level of safety pursuant to Section 333 of the Reform Act. The FAA is authorized to exempt aircraft from the airworthiness certificate requirement under both the Act (49 U.S.C. § 44701 (f)) and Section 333 of the Reform Act. Therefore, relief from 14 CFR part 21, and any associated noise certification and testing requirements of part 36, is not necessary.

Instead of following this requirement, we will as outlined in this document, as per our Flight Operations and Procedures Manual and Training Manual (currently in development), Force 4 Photography seeks to uphold the same level or exceeded level of safety as described in Part 21 of 14 C.F.R. Therefore this exemption will not adversely affect safety or will provide a level of safety equal to the existing rule.

14 CFR 45.23 Display of Marks

This section outlines regulations requiring specific location(s) and size of aircraft marks. We seek relief from this rule because, given the size of our UAS, and the lack of cabin, cockpit or pilot station, two-inch lettering is difficult to place on such small aircraft.

Instead of following this requirement, we will mark the UAS in lettering that is as large as practicable by placing an N number registered with the FAA on its fuselage so that the PIC, VO, or other observers will see the markings. This exemption will therefore not adversely affect safety or will provide a level of safety equal to the existing rule.

14 CFR 61.113 (a) & (b) Private Pilot Privileges and Limitations

This section describes regulations concerning certification of pilots. We seek relief from this rule because the risks associated with the operation of a UAS are lesser than and often uncorrelated with the risks associated with the commercial and private aircraft operations contemplated by Part 61 when drafted. The skills required to fly large, manned aircraft are substantially different from the skills required to remotely operate a small UAS. Also, manned aerial vehicles weighing significantly more than small drones (such as ultralight vehicles) as well as small UAS legally operated by hobbyists, operate without the need for pilot certification.

Requiring a private or commercial pilot certificate would provide no appreciable safety benefit and would needlessly impose an undue burden of time and cost on Force 4 Photography, most particularly in light of the FAA's Small UAS Notice of Proposed Rulemaking which proposes that small UAS pilots be considered 'operators' required to meet certain requirements that do not include pilot's license.

Instead of following this requirement, to minimize risk and maximize safety, all UAS operations will be controlled and limited, and all flights will be planned and coordinated prior to operations:

- prior to operations, Force 4 Photography's PIC(s) will go through a documented process of dedicated ground school and flight lessons in accordance with manufacturer and industry guides.
- all PIC's will only operate the UAS as stated in this document and in our Flight Operations and Procedures Manual, flying at altitudes well below the permissible limits for other civil aircraft, and within a geographical envelope under the control of Force 4 Photography clients.
- the PIC will be designated before a flight and will not transfer control at any time during a flight.
- Force 4 Photography PICs will comply with upcoming FAA Operator Certification and Responsibilities once they are finalized.

This exemption will therefore not adversely affect safety or will provide a level of safety equal to the existing rule. More information about pilot safety can be found in the *Operation of the Unmanned Aircraft to Minimize Risk to the NAS, People and Property* section of this document.

14 CFR 91.105 Flight crewmembers at stations

This section outlines regulations for flight crewmembers inside an aircraft. We seek relief from this rule because there is no flight crew onboard a small UAS.

Instead of following this requirement, in keeping with the direction of the regulation, the PIC of the UAS and VO will be at their respective crewmember stations on the ground during takeoff and landing as well as the complete duration of the flight. By instituting this procedure this exemption will therefore not adversely affect safety or will provide a level of safety equal to the existing rule.

14 CFR 91.109 (a) Flight Instruction

This section 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. We seek relief from this rule because UAS do not have fully functioning dual controls.

Instead, 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. This exemption will therefore not adversely affect safety or will provide a level of safety equal to the existing rule.

14 CFR 91.119 (c) Minimum safe altitudes: General.

This section establishes minimum altitudes for operation of civil aircraft. We seek relief from this rule because the services we intend to provide for the public good may require photo or video images captured from an altitude of less than 500 feet.

Instead of following this requirement, all UAS flights will be conducted with within visual line of sight and with prior permission from the owner of the property or municipality. All persons, vessels, vehicles, not directly involved with the operation will be notified and cleared of the area where UAS operations will be conducted. Given our policies of advance notice and access restricted area, and given the size, weight, maneuverability and speed of our UAS, we will maintain an equivalent or higher level of safety of that described in this rule.

14 CFR 91.121 Altimeter settings
This section defines regulations for altimeter settings. We seek relief from this rule concerning altimeter settings because: our UAS has no altimeter settings. Instead, electronic GPS downlinks telemetry data in real time to the PIC's ground-based on-screen display as to the altitude (AGL) of the UAS above the takeoff location.

This exemption will not adversely affect safety, as our PIC will provide a level of safety equal to the existing rule by confirming the altitude of the launch site shown on the GPS altitude indicator prior to each flight.

14 CFR 91.151 (a) Fuel Requirements for Flight in VFR Conditions
This regulation 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." We seek relief from this rule because our UAS runs on battery instead of fuel, most of our UAS flights last less than the 30 minute reserve requirement, and we do not fly at night.

Instead of following this requirement, an equivalent level of safety will be achieved by following the UAS manufacturer's operating documents with regard to battery voltage. To ensure safety and maintain adequate communication between radio contol and the UAS, our PIC will not begin a flight with a battery holding less than 75% charge; and will not begin a flight unless (considering wind and forecast weather conditions) there is enough power to fly to the intended landing point at normal cruising speed and land the UAS with no less than 30% of battery power. A landing sequence will be initiated at the 30% warning and the UAS automatically initiates landing sequence at 15% charge while still under PIC control.

Through implementation of these procedures, this exemption will not adversely affect safety or will provide a level of safety equal to the existing rule.

14 CFR 91.203 Carrying Civil Aircraft Certification and Registration
This regulation pertains to display of airworthiness certification within an aircraft. We seek relief from this rule because our small UAS each weigh less than 10 pounds, and are operated without an onboard pilot. There are passengers or crew; and no cabin or cockpit entrance upon which to display certificates.

An equivalent level of safety will be achieved by keeping these documents at the ground control point where the PIC will have immediate access to them, and be able to provide them upon request.

14 CFR 91.405 (a) Maintenance required; 14 CFR 91.407 (a) (1) Operation after maintenance, preventive maintenance, rebuilding, or alteration; 14 CFR 91.409 (a) (2) Inspections; and 14 CFR 91.417 (a) & (b) Maintenance records
We seek relief from these 4 rules because these regulations only apply to aircraft with an airworthiness certificate, and will not, therefore, apply to Force 4 Photography's UAS. We seek relief also because the FAA has not developed maintenance standards for UAS that would allow an UAS operator to meet the part 91 maintenance requirements. In particular, there are no individuals authorized by the FAA to approve a UAS for return to service or to conduct the initial airworthiness and annual return to service inspections as required.

Instead of following these requirements, we will:

- perform preventative and required maintenance on each aircraft as per the owner's manuals.
- inspect our UAS before and after each flight as per our Flight Operations and Procedures Manual to ensure that the UAS is in a condition for safe flight.
- will conduct a test flight on each aircraft following any major repairs.
- will properly note all discrepancies, maintenance, and alterations in a Maintenance Log.

Therefore this exemption would not adversely affect safety or would provide a level of safety equal to the existing rule. More information about maintenance procedures can be found in the *Operation of the Unmanned Aircraft to Minimize Risk to the NAS, People and Property* section of this document.

14 CFR 91.7 (a) Civil aircraft airworthiness

This section states that "no person may operate a civil aircraft unless it is in an airworthy condition." We seek relief from this rule based on the fact that Force 4 Photography's UAS will not require an airworthiness certificate in accordance with 14 CFR part 21, Subpart H. Based on the fact that an airworthiness certificate will not be issued, exemption from § 91.7(a) is not necessary.

An equivalent level of safety will be achieved through the guidance from our Flight Operations and Procedures Manual, pilot training, and operational risk management for each activity.

14 CFR 91.9 (b) Civil aircraft flight manual, marking, and placard requirements

This section requires an aircraft flight manual in the aircraft. We seek relief from this rule based on the small size of our UAS and the fact that our UAS carries no onboard pilots or passengers. Given its size and configuration there is no room or capacity in our UAS to carry such an item. This regulation is therefore inapplicable.

An equivalent level of compliance will be achieved by keeping our versions of these documents at the ground control point where the PIC will have immediate access to them, and be able to provide them upon request.

Public Benefit: how our request would benefit the public as a whole

Granting Force 4 Photography the ability to operate small UAS safely and legally in the National Airspace System will have the following positive economic and societal impacts on local communities, businesses, organizations and community members:

- benefit local business marketing by offering state-of-the-art aerial photography and videography
- help to inspect buildings and structures, and map landscapes in a safe, cost-effective manner
- provide economic stimulus and public benefit by providing an effective means by which companies or individuals looking to relocate to an area can use up-to-date, high-quality photos and videos of real estate properties to learn about properties, neighborhoods and communities

- help communities realize economic benefit by encouraging public participation and encouraging tourism by showcasing community buildings and landscapes and by documenting community events in low-cost ways not previously available to them
- increase awareness/knowledge of the amenities of a local area by the general public and by visiting tourists
- provide non-profit organizations as well as schools and universities and local municipalities ways to showcase facilities, document events, and educate the public
- aid in search and rescue operations and accident investigators.

All of the above services:

- are otherwise unavailable to the public, given the UAS's the ability to:
    - safely capture images from 0 to 400 feet.
    - create images that are more up-to-date and more closely defined than Google Earth-type satellite images.
    - create images at prices lower than that of traditional helicopter and airplane photography and videography.
- increase safety of and reduce risk to the public and the NAS by:
    - replacing large manned helicopter and airplane flights with small UAS flights, thereby reducing air and and noise pollution as well as the dangers inherent in flying aircraft loaded with crewmembers and combustible fuel close to people and property.
    - offering safer ways to inspect tall structures and remote locations, e.g. removing the physical risk of climbing on a roof or structure to inspect it.
- reduce environmental pollution and reliance on fossil fuels by replacing fueled aircraft flights with battery-operated UAS flights.

Operation of the Unmanned Aircraft to Minimize Risk to the NAS, People and Property

Concerning our commercial UAS flight operations, we take seriously our obligation to clearly define operational borders, and implement operational risk management procedures to ensure the public safety of persons and property both in the air and on the ground.

While Force 4 Photography currently provides photography and videography services in southeastern New England, we may at times contract with clients throughout the U.S. Our area of intended operations include a range of population areas, from urban to rural, with some areas, especially coastal ones, experiencing seasonal increases and decreases in activity from both people and aircraft. Our operations will take into account these variations in populations and activities. My experience in navigation, vessel operations, search and rescue, and maritime enforcement as a veteran of the U.S. Coast Guard enables me to apply operational risk management techniques when assessing situations where the safety of the general population and the NAS are concerned.

Meeting or exceeding COA requirements to perform commercial operations in low-risk, controlled environments, our UAS will be operated:

- during daytime Visual Flight Rules (VFR) conditions and visual meteorological conditions (VMC).
- within visual line of sight (VLOS) of the Pilot in Command (PIC) or the Visual Observer (VO), in accordance with the statutory Section 333(b)(1) mandate.
- in such a manner that the PIC and VO are able to communicate verbally at all times; and that the VO can assist the PIC with seeing and avoiding other air traffic and other ground-based obstacles/obstructions.

We will not operate our UAS:

- at altitudes exceeding 400 feet AGL
- in winds exceeding 25 knots.
- from any moving vehicle or device.
- at airspeeds greater than the maximum recommended by the manufacturer.
- less than 500 feet below or less than 2000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.
- unless (considering wind and forecast weather conditions) there is enough available power for the UAS to conduct the intended operation and to operate after that for at least 5 minutes or with the reserve power recommended by the manufacturer if greater.

- near areas where general public is within 200 feet; or directly over any person except authorized Force 4 Photography personnel and consenting inspection personnel, unless operations nearer to the PIC do not present an undue hazard to those persons; or unless 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.
- near power lines, wind turbines, or elevated lights; or within areas of airspace restrictions such as the one imposed by the National Park Service.
- near airports, heliports, or military bases; more specifically:
    - In accordance with the statutory Section 333 mandate regarding proximity to airports, we will stay certain distances away from airports or heliports: 5 NM from an airport having an operational control tower; or 3 NM from airport w/ a published instrument flight procedure, but not operational tower; or 2 NM from an airport w/out published instrument flight procedure or an operational tower; or 2 NM from a heliport with a published instrument flight procedure.
    - We will 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 will be made available to the Administrator or any law enforcement official upon request.
- If we intend to conduct operations in controlled airspaces which have existing requirements to notify Flight Standards District Offices (FSDOs) prior to operations – such as motion picture and television filming, or pipeline and powerline patrol – we will contact the local FSDO and comply with their procedures, such as filing a NOTAM as per their request.

Our Flight Operations and Procedures Manual, will include procedures for:

- conducting a preflight safety risk assessment to determine that the UAS is in a condition for safe flight, i.e. completing a preflight inspection checklist to ensure the UAS's airworthiness. If the inspection reveals a condition that affects the safe operation of the UAS and/or the Ground Control Station, the aircraft will be prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.
- maintaining a Flight Log (noting UAS flight time, Control Unit operation time, incident reports, etc.); and making said Log available to the FAA if requested.
- conducting initial and ongoing training of PICs and VOs, to include classroom training, and training, proficiency and experience-building flights; all persons not essential for flight operations will be considered nonparticipants, and the PIC will operate the UAS with appropriate distance from nonparticipants in accordance with 14 CFR 91.119.
- evaluating the operational abilities of PICs and VOs on a regular basis.
- maintaining and repairing the aircraft to ensure that it is in a condition for safe operation by:
    - following the UAS manufacturer's maintenance, overhaul,replacement inspection, and life limit requirements and safety bulletins for the aircraft and its components.
    - installing firmware updates provided by the manufacturer.
    - keeping a Maintenance Log noting all maintenance, inspection, alterations, and status of replacement/overhaul component parts in the aircraft records, including total time in service, description of work, and signature of the authorized person returning the UAS to service; and making said Log available to the FAA if requested.
    - verifying condition of flight batteries and calibrating the Inertial Measurement Unit (IMU) using manufacturer software.
    - conducting a functional test flight on any UAS that has undergone maintenance or alterations that affect the UAS operation; said functional test flight will be conducted by a PIC with a VO and so as to not pose an undue hazard to persons and property; and recorded in the aircraft records.
- procedures that ensure that the planned operation can be completed safely, such as:
    - checking local sectional (air) charts, notam (notice to airmen), etc. prior to the flight.
    - conducting a pre-flight visual survey of the area to consider characteristics of the area of intended operation(s) and the associated potential hazards regarding proximity to populated areas.
    - remaining clear and giving way to all manned aviation operations and activities at all times.
    - aborting a flight and landing the UAS at the nearest and safest ground point in the event of safety breaches, potential danger, unpredicted obstacles or emergencies.
    - using a fresh, fully-charged battery with each flight as a safety precaution, to ensure safety and maintain adequate communication between radio contol and the UAS; and not operating our UAS at or below manufacturer recommend minimum charge levels for operation.

Also:

- Flight operations will be performed only at the request of and with the authorization and permission of clients (property owner/controller) or their authorized representatives.
- Caution signs will be placed at the site of aerial operations to warn people that aircraft operations are in progress.

- Our Client Agreements will reserve us the right to decline a photo shoot if conditions of the location (e.g. proximity of power lines) may cause unacceptable risk; and to reschedule a photo shoot if weather conditions such as precipitation or wind speed become a factor.
- The operating documents for our UAS, and any revisions, will be accessible during UAS operations and made available to the Administrator or law enforcement official upon request.
- We carry comprehensive general liability insurance coverage and an additional insurance policy specifically covering our UAS.

Summary for Federal Register

Kevin Ham of Force 4 Photography LLC, Buzzards Bay, Massachusetts, seeks exemption from Federal Aviation Regulations pursuant to 14 C.F.R. and Section 333 of the FAA Modernization and Reform Act of 2012 for the purpose of commercially operating small Unmanned Aircraft Systems (UAS) safely and legally in the National Airspace System.

Specifically, Force 4 Photography seeks relief from the following sections of the current regulations: 14 CFR 21 subpart H - Certification procedures; Airworthiness Certificates; 14 CFR 45.23 - Display of Marks; 14 CFR 61.113 (a) & (b) Private Pilot Privileges and Limitations; 14 CFR 91.105 Flight crewmembers at stations; 14 CFR 91.109 (a) Flight instruction; 14 CFR 91.119 (c) Minimum safe altitudes; 14 CFR 91.121 - Altimeter settings; 14 CFR 91.151 (a) - Fuel Requirements for Flight in VFR Conditions; 14 CFR 91.203 Carrying Civil Aircraft Certification and Registration; 14 CFR 91.405 (a) 14 CFR 91.407 (a) (1), 14 CFR 91.409 (a) (2) Maintenance required; Operation after maintenance, preventive maintenance, rebuilding or alteration; 14 CFR 91.417 (a)&(b) Maintenance Records; 14 CFR 91.7 (a) - Civil Aircraft Airworthiness; 14 CFR 91.9 (b) Civil aircraft flight manual, marking, and placard requirements.

Force 4 Photography intends to use small UAS to provide aerial photography and videography services to businesses, organizations and community members. More specifically, we intend to:

- enable businesses to benefit through the use of state-of-the-art visual marketing materials
- help to inspect buildings and structures, and map landscapes in a safe, cost-effective manner
- provide economic stimulus and public benefit by providing an effective means by which companies or individuals can use up-to-date, high-quality photos and videos to learn about properties, neighborhoods and communities
- help communities realize economic benefit by encouraging public participation and encouraging tourism; by showcasing community buildings and landscapes; and by documenting community events in low-cost ways not previously available to them
- increase awareness/knowledge of the amenities of a local area by the general public and by visiting tourists
- provide non-profit organizations as well as schools and universities and local municipalities ways to showcase facilities, document events, and educate the public
- aid in search and rescue operations and accident investigators.

The enhanced safety achieved using an UAS with the specifications described herein, and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew

in addition to flammable fuel, should give the FAA good cause to find that such exemption is in the public interest. By granting this request for exemption, the FAA will facilitate the smooth integration of UAS into the NAS.

Additional Information

Design Characteristics, Aircraft Performance and Performance Limitations, and Conditions of UAS to be Operated

All three UAS described below:

- utilize 4 counter-rotating propellers for balance, control and stability
- are equipped with GPS to maintain geospatial orientation and position
- use Return Home safety technology and Auto Landing feature if UAS loses transmitter signal
- are controlled primarily through FCC approved RF spectrum transmitter/controller/receivers; and FCC approved RF spectrum EIRP with transmitting power of 100 mW for dedicated wifi transmitter/receiver between sUAS, Range Extender attached to transmitter and mobile viewing device displaying operational telemetry and video/photography functions.
- send real time video and telemetry information is transmitted back to a ground control station, allowing PIC to monitor battery level, GPS signal strength, altitude (AGL), distance from PIC, camera imagery, and control camera angle.
- have failsafe modes of operation for either loss of RC or GPS signal. Altitude can be limited by the onboard flight controller and maximum altitude can be preprogrammed by the PIC.
- have audible and visual sequential low battery warnings set at 30% charge and 15% charge remaining. The sUAS automatically initiates landing sequence at 15% charge while still under PIC control. The onboard flight controller will warn the pilot via telemetry and external lighting cues before reaching a low battery state. An automatic termination of flight and landing will be initiated when the battery reaches a predetermined low state.

DJI Phantom 2 Vision+

- Gross weight of less than 3 pounds including camera and battery
- Cruising speed of 15 knots, with a maximum speed of 29 knots and maximum altitude of 800m
- Maximum flight time of 25 minutes
- FCC compliant Radio Frequency (RF) spectrum 5.728GHz—5.8GHz
- manual available at https://www.dji.com/product/phantom-2-vision-plus/download

DJI Phantom 3 Professional

- Gross weight of less than 3 pounds including camera and battery
- Cruising speed of 15 knots, with a maximum speed of 31 knots and maximum altitude of 6000m
- Maximum flight time of 23 minutes

- FCC compliant Radio Frequency (RF) spectrum 2.400 GHz-2.483 GHz
- manual available at http://www.dji.com/product/phantom-3/download

DJI Inspire 1

- Gross weight of less than 7 pounds including camera and battery
- Cruising speed of 15 knots with maximum speed of 42 knots and maximum altitude of 4500m
- Maximum flight time of 18 minutes
- FCC compliant Radio Frequency (RF) spectrum 5.725~5.825 GHz and 2.400~2.483 GHz
- manual available at http://www.dji.com/product/inspire-1/download

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