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

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

August 6, 2015

Exemption No. 12366
Regulatory Docket No. FAA–2015–1803

Mr. Jonathan W. Chapman
Survey Project Manager
R.A. Smith National, Inc.
16745 West Bluemound Road, Suite200
Brookfield, WI 53005-5938

Dear Mr. Chapman:

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 April 21, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of R.A. Smith National, Inc. (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial image acquisition.

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 and 3D Robotics X8+.

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, R.A. Smith National, Inc. 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, R.A. Smith National, 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.

1. Operations authorized by this grant of exemption are limited to the DJI Phantom 2 and 3D Robotics X8+ 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 August 31, 2017, unless sooner superseded or rescinded.

Sincerely,
/s/
John S. Duncan
Director, Flight Standards Service

Enclosures

April 21, 2015U.S. Dept. of Transportation, Docket Operations
West Building Ground Floor, Room w12-140
1200 New Jersey Avenue, SE.,
Washington, DC 20590

Submitted Electronically via the Federal Docket Management System (FDMS)

Re: Exemption Request under Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations

Dear Sir or Madam:

On Behalf of R.A. Smith National, Inc. and Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 and 14 C.F.R. Part 11, I Jon Chapman Survey Project Manager at R.A. Smith National, Inc., request an exemption from Part 21 Subpart H; and Sections 91.203 (a) (1), 45.23 (b), 91.7 (a), 91.9, 61.113, 61.133, 91.109, 91.119, 91.121, 91.151, and (91.401 - 91.417) Subpart E, of Title 14, Code of Federal Regulations (14 CFR).

This proposed exemption would allow for the operation of our unmanned aircraft (UA) the DJI Phantom 2 and the 3DR X8+ (Multi-Rotors) for the purpose of aerial image acquisition.

This exemption cites similarity with relief previously requested in Grant of Exemption Nos. 11062, 11109, 11112, 11213, and 11138

The DJI Phantom 2 and 3DR X8+ are comprised of the Unmanned Aircraft (UA) and ground station-based equipment and crew:

THE UNMANNED AIRCRAFT (UA's):

- DJI Phantom 2, and the 3DR X8+ are lightweight (under 3lb. gross weight), battery operated Multi-Rotors that takes off and land vertically.

THE UA's INCLUDES:

- An on-board flight computer with GPS navigation and location ability that receives signals for flight controls from a ground-based transmitter/controller;
- A Gimbal with a GoPro camera capable of capturing imagery in the form of full color, high definition still photos and video
- An on-board telemetry system that delivers flight data from the on-board flight computer to the on-board radio transmitter including altitude AGL, horizontal and vertical speed, compass direction of flight and direction back to its launch site
- A 5.8GHz on-board radio transmitter that transmits live video from the on-board camera plus all the flight data from the telemetry system described above

THE GROUND STATION PART OF THE SYSTEM:

- A Pilot in Command (PIC) who will be in operational control of the mission from beginning to end, and who controls the UA while in the air

- A Visual Observer (VO), a person who provides a second pair of eyes to visually track the UA while in flight.
- The DJI includes a 2.4GHz radio transmitter/controller operated by the PIC to control the UA while in flight
  - The 3DR includes a 915 MHz transmitter/controller operated by the PIC to control the UA while in flight
- The DJI Phantom 2 Ground Station DJI Vision App which receives and displays video and system telemetry real time from the UA
  - The 3DR includes an Android based Ground Station such as Droid Planner 3, which receives and displays video and system telemetry real time from the UA

UAS OPERATING GUIDELINES:

UA's will be operated in the field with both a PIC and a VO in accordance with the following Restrictions:

- All operations must occur in FAA Class G airspace at no more than 400 ft AGL, at airspeed of no more than 25 knots and always within Visual Line of Sight.
- All operations must utilize a visual observer (VO). The VO and PIC must be able to communicate by voice at all times during a flight operation
- The PIC must have accumulated and logged, in a manner consistent with 14 CFR § 61.51 (b), 10 hours of total time as a UA rotorcraft pilot and at least 5 hours logged as a UA pilot with a similar UA type
- The UA will not be operated over densely populated areas; without prior approval
- The UA will not be operated over any open-air assembly of people; without prior approval
- The UA will not be operated within 5 NM of an airport or heliport; without prior approval
- The UA will not be operated at air shows
- Operations will be restricted to day only and weather conditions equivalent to VFR
- The PIC will brief the VO and property owner about the operation and risk before operation
- No flight will be made without a Pre-Flight Inspection by the PIC before each operation to ascertain that the UA is in a condition safe for flight

PILOT IN COMMAND (PIC) AND VISUAL OBSERVER:

The PIC and VO will meet the requirements outlined in FAA Policy N 8900.227 Section 16 personnel Qualifications. Additionally, the PIC will hold at a minimum, a current Sport Pilot certificate. The PIC will perform maintenance on the system in accordance with manufacturer guidelines and/or instructions.

In the event the PIC cannot perform maintenance, the UA will be returned to the manufacturer or a manufacturer certified technician to perform any necessary repairs.

I submit that the combination of the UA's light weight, flight performance and ability, fully qualified flight crew and strict operation under the guidelines established in 8900.227, and under all of the Restrictions listed above, the FAA can have full confidence that the operation will have an equivalent or greater level of safety than manned aircraft performing the same mission.

INTENDED USE:

The requested exemption would allow us to use the UA for aerial image acquisition to support various mapping and surveying applications as well as video documentation for the public good. Typical applications would include, but are not limited to:

- Aerial Photography
- Aerial Surveys
- Volumetric Surveys
- Architectural Surveys
- Bridge Inspections
- Utility Corridor Vegetation Management
- Building Inspection Surveys
- Disaster Response

The inherent ability of the UA is to capture imagery from a low altitude including oblique photos and video from several angles is far more effective than ground-based imagery for displaying the characteristics of buildings, sites and properties being developed or areas where consistent monitoring is needed. The applicant in the past has chartered fixed wing aircraft and/or helicopters for this purpose, which have proven more costly than many potential clients have been able to afford, resulting loss of opportunities. The reduced cost and higher quality data from the use of UA's is beneficial to the public in applications involving projects for public use such as monitoring construction of new roadways, street improvement projects, and preservation of historic buildings or archeological sites where access is limited. In addition UA's may be the first systems on site to assist first responders in the event of natural disasters.

PUBLIC SAFETY:

UA's, are powered by batteries, they are smaller, lighter and more maneuverable than larger aircraft running on combustible fuel; they operate at lower altitudes (under 400') and weigh less than 3lbs with no people on board thereby reducing current risk levels and enhancing public safety. With a small payload and maximum flight time of approximately 22 minutes, UA's offer little or no risk to national security.

SUMMARY GRANT REQUEST:

This request follows many others using similar systems and process that have been granted previously. I am requesting the FAA issue a summary grant of exemption as this request would not set a precedent.

- The reasons stated by the FAA for granting Exemption Nos. 11062, 11109, 11112, and 11213 also apply to this request
- A grant of exemption would be in the public interest
- Denial of this exemption request would unfairly limit our ability to provide these services to our clients

THE REGULATIONS FROM WHICH THE EXEMPTIONS ARE BEING REQUESTED

Beside each regulation number is the page of the attached Addendum upon which each may be found together with a proposed equivalent level of safety for each regulation:

- 14 CFR Part 21 Subpart H	Addendum Page 1
- 14 CFR 91.203 (a) (1)	Addendum Page 1
- 14 CFR 45.23 (b)	Addendum Page 1
- 14 CFR 91.7 (a)	Addendum Page 2
- 14 CFR 91.9	Addendum Page 2
- 14 CFR 61.113, 61.133	Addendum Page 2
- 14 CFR 91.109, 91.119, 91.121	Addendum Page 3
- 14 CFR 91.151	Addendum Page 3
- 14 CFR Subpart E (91.401 - 91.417)	Addendum Page 4
- FAA Policy 8900.227 Paragraph 16(c)(4) and Paragraph 16(e)(1)	Addendum Page 4

I am prepared to modify or amend any part of this request to satisfy the need for an equivalent level of safety. Please contact us at any time if you require additional information or clarification.

I am the primary point of contact for this request and look forward to working with your office.

Sincerely,

Jonathan W. Chapman,
Survey Project Manager
R.A. Smith National, Inc.
16745 West Bluemound Road, Suite200
Brookfield WI 53005-5938
Phone: 262-317-3366
Email: Jon.Chapman@rasmithnational.com

Addendum Containing Exemption Requests and Equivalent Level of Safety
Appendix A – Flight Operations/Procedures
Appendix B – Owner's Manual for (DJI Phantom 2)
Appendix C – Owner's Manual for (3DR X8+)

ADDENDUM

EXEMPTION REQUESTS AND EQUIVALENT LEVEL OF SAFETY

I, Jon Chapman Survey Project Manager at R.A. Smith National, Inc. request an exemption from the following regulations as well as any additional regulations that may technically apply to the operation of the DJI Phantom 2 and the 3DR X8+ (UA's):

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 UA to be utilized by the Petitioner, an exemption from Part 21 Subpart H meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the FMRA. The Federal Aviation Act (49 U.S.C.44701 (f)) and Section 333 of the FMRA 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 UA. In all cases, an analysis of these criteria demonstrates that the UA 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 UA to be operated hereunder is less than 55 lbs. fully loaded, is by definition unmanned and carries neither a pilot nor passenger, carries no explosive materials or flammable liquid fuels, and operates exclusively within a limited flight area. Unlike other civil aircraft, operations under this exemption will be tightly controlled and monitored by the Operator and will also remain within the requirements of, and in compliance with, local public safety requirements. These safety enhancements, which already apply to civil aircraft 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 UA 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 UA will have no airworthiness certificate, an exemption may be needed as the UA will have no entrance to the cabin, cockpit or pilot station on which the word "Experimental" can be placed. Given the size of the UA, 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 UA marked on its fuselage as required by 45.29 (f) where the pilot, observer and others working with the UA will see the identification of the UA as "Experimental."

The FAA has issued the following exemptions to this regulation to Exemptions Nos. 10700, 8738, 10167 and 10167 A.

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 and the requirements contained herein for the use of safety check lists prior to each flight, an equivalent level of safety will be provided.

14 CFR 91.9 Civil aircraft flight manual, marking, and placard requirements.

This regulation provides that no person may operate an aircraft unless a current, approved flight manual is in the aircraft. We assume that the intent of this requirement is to ensure that flight manual information is available to the aircrew while operating the aircraft. We request an exemption to this requirement since the aircraft is not only too small to carry documentation; the documentation would not be available to the crew during flight operations.

To obtain an equivalent level of safety and meet the intent of 91.9, we propose that a current, approved UA Flight Operations/Procedures (Appendix A) must be available to the crew at the ground station anytime the aircraft is in, or preparing for, flight.

The FAA has issued the following exemptions to this regulation: Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 95658, 10167, 10167A, 10602, 32827, and 10700.

14 CFR 61.113 Private pilot privileges and limitations: Pilot in Command and 61.133 Commercial pilot privileges and limitations.

The regulation provides that no person that holds a private pilot certificate may act as pilot in command of an aircraft for compensation or hire. Subparagraph (b) allows a private pilot to act as pilot in command 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.

Our proposed operations require that the PIC must either

1. Hold a Private Sport Certificate issued by the FAA, and have logged 10 hours of flight experience in this type of UA, or
2. Meet the requirements of 8900.227 para 16(c)(2)(c) "Operations without a pilot certificate" in which the PIC is required to complete "FAA private pilot ground instruction" and pass "the FAA Private Pilot written examination." Since there are currently no means available for the pilot of a UA to gain the experience in an equivalent category and class in order to apply for a private pilot's license, we propose to generate an equivalent level of safety by requiring our pilots to complete, at a minimum, FAA private pilot ground instruction and pass the FAA Private Pilot written examination in addition to completing the private pilot requirements. Since the aircraft cannot carry passengers or property, we feel that we meet the intent of 61.113 Subparagraph (b) even though the intent of this application is to conduct a business.

14 CFR 91.109 Flight Instruction; Simulated instrument flight and certain flight tests
The regulation states that "No person may operate a civil aircraft that is being used for flight instruction unless that aircraft has fully functioning dual controls."

The UA's ground-based control station consists of a small hand-held radio transmitter and while it does not offer a second set of "controls", both the student and instructor can, and will, operate the single set of controls simultaneously. With both student and instructor having "hands-on" the controls during flight, we feel that this technique meets the intent 91.109 and provides an equivalent level of safety.

14 CFR 91.119 Minimum safe altitudes: General.

The regulation states that over sparsely populated areas the aircraft cannot be operated closer than 400' feet to any person, vessel, vehicle, or structure. Since the aircraft will be operating at a maximum of 400' feet AGL, we cannot comply with this requirement.

In order to provide an equivalent level of safety The UA's will not be operated over congested areas or over any open air assembly of persons without prior approval. Any property owner affected will be briefed on the expected route of flight and the associated risks to persons and property on the ground. The aircraft will be operated at a low altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface. Therefore we maintain that due to the small size of the UA, the hazard to persons, vehicles and structures is minimal compared to manned aircraft, which should be considered in granting the exemption.

14 CFR 91.121 Altimeter Settings.

The regulation requires that aircraft shall maintain cruising altitudes by reference to an altimeter setting available within 100 NM of the aircraft.

The UA will always fly below 400' feet AGL and will not need to maintain cruising altitudes in order to prevent conflict with other aircraft. An Above Ground Level altimeter measurement above the takeoff point is transmitted via radio from the UA'S on-board computer to the display screen held by the PIC, providing a constantly updated AGL readout.

14 CFR 91.151 Fuel requirements for flight in VFR conditions.

The regulation provides that no person may begin a flight in an airplane under day-VFR conditions unless there is enough fuel to fly to the first point of intended landing and to fly after that for at least 30 minutes.

The intention of this paragraph is to provide an energy reserve as a safety buffer for delays to landing. Each UA is battery operated and the maximum duration of flight from a single battery charge is 20 minutes with a 20% reserve. Since the aircraft will never fly more than 3/4NM from the point of intended landing, a full battery charge at launch will ensure that we meet the reserve energy requirement of this paragraph. We request an exemption to the word "fuel" and ask for an equivalent interpretation with the word "energy".

14 CFR Subpart E (91.401 - 91.417) - Maintenance, Preventive Maintenance, Alterations

The regulation provides that the operator is primarily responsible for maintaining the aircraft in an airworthy condition, including compliance with part 39 and 43. Paragraphs 91.407 and 91.409 require that the aircraft be "approved for return to service by a person authorized under 43.7" after maintenance and inspection.

It is our intention that the PIC perform maintenance and inspection of the aircraft and "be authorized to approve the aircraft for return to service." As provided in the Pre-Flight Checklist in Appendix A, the PIC will ensure that the aircraft is in an airworthy condition prior to every flight and in addition conduct detailed inspections after every two hours of flight. Maintenance performed by the PIC is limited to repairing small cracks, replacing a propeller, checking electrical connections and updating software and firmware for the on-board computer. All other maintenance will be performed by the manufacturer or their designated repair facility. The PIC will document work performed in accordance with 91.417. We feel that due to the size, construction, and simplicity of the aircraft, the PIC can ensure an equivalent level of safety.

8900.227 Paragraph 16(c)(4) PIC Medical. And Paragraph 16(e)(1) Observer Medical.

This policy provides that both the PIC and VO must have a valid FAA second-class medical certificate issued under part 67 in order to perform as a pilot or observer.

The UA's maximum gross weight is less than 3lbs., are constructed primarily of, plastic and carbon fiber. The PIC is not on board. Both the PIC and the VO are required to be in VLOS. Given the unlikely event that both the PIC and VO become medically incapacitated while the aircraft is in flight, the UA will return autonomously to the site of launching and land without crew intervention. Therefore, requiring the PIC and VO to meet the same medical requirements as commercial pilot carrying passengers in a large aircraft is an unnecessary burden.

We propose that the minimum medical requirements for the PIC and VO be vision corrected to 20/20 and a valid, state issued driver's license. The 20/20 vision requirement will ensure that the PIC and VO can see and avoid air traffic; a licensed driver is medically qualified to operate a much larger vehicle.

APPENDIX A – FLIGHT OPERATIONS/PROCEDURES

The UA will be operated under the following flight restrictions. Restrictions and procedures are the same for both UA's in this request

OPERATIONAL FLIGHT RESTRICTIONS

The UA will be operated in the field with both a PIC and a VO in accordance with and with the following Restrictions:

- All operations must occur in FAA Class G airspace at no more than 400 ft AGL, at airspeed of no more than 25 knots and always within Visual Line of Sight.
- All operations must utilize a visual observer (VO). The VO and PIC must be able to communicate by voice at all times during a flight operation
- The PIC must have accumulated and logged, in a manner consistent with 14 CFR § 61.51 (b), 10 hours of total time as a UA rotorcraft pilot and at least 5 hours logged as a UA pilot with a similar UA type
- The UA will not be operated over densely populated areas; without prior approval.
- The UA will not be operated over any open-air assembly of people; without prior approval
- The UA will not be operated within 5 NM of an airport or heliport; without prior approval
- The UA will not be operated at Air Shows
- Operations will be restricted to day only and weather conditions equivalent to VFR;
- The PIC will brief the VO and property owner about the operation and risk before operation
- No flight will be made without a Pre-Flight Inspection by the PIC before each operation to ascertain that the UA is in a condition safe for flight

PRE-FLIGHT CHECKLIST

Once on site the Pilot-In-Command (PIC) and a Visual Observer (VO) will:

- Assess the area for potential hazards
- Determine the take-off and landing (return to home) location
- Place signage if necessary noting survey in progress
- Brief all personnel present on the upcoming aerial acquisition
- Instruct those not involved in the aerial acquisition on a safe viewing location

The PIC and VO will then move all equipment necessary to the launch location.

At this time the PIC and/or VO will go through the preflight checklists provided by the manufacturer of the UA. Below is such an example.

- Remove the UAS from its case
- Insert battery
- Install and/or confirm propellers are tightened
- Connect the Ground Station device to the Flight Controller

- Turn on the Flight Controller and Ground Station Device
- Turn the UAS on and run system checks
- Ensure communications between the UAS, Flight Controller and Ground Station Computer are operating properly

If everything appears to be operating correctly the PIC will then begin the mission.

TAKE OFF/LANDING PROCEDURES

Manufacturer recommended Takeoff and Landing procedures will be followed.

Place the UA on ground with the battery level indicator facing you.

1. Power on the remote controller.
2. Power on the range extender.
3. Switch the camera to the "WIFI ON" position.
4. Power on the aircraft by turning on the intelligent battery
5. Connect the mobile device to the UA, run the Ground Station App to enter the camera preview page.
6. Wait until the UA is initializing and entering the "Ready to Fly"/"Ready to Fly (non-GPS)." state. Then proceed to execute the CSC command to start motors.
7. Push the throttle stick up slowly to lift the aircraft off the ground.
8. When landing, be sure to be hovering over a level surface. Pull down on the throttle stick gently to descend and land.
9. After landing the aircraft on the ground, keep the throttle stick at its lowest position for about 3 to 5 seconds which will automatically stop the motors.

FAILSAFE FUNCTION

The UA will enter Failsafe mode when the connection from the remote controller is lost. The flight control system will automatically control the aircraft to return to home and land to reduce injuries or damage. The following situations would make the aircraft fail to receive a signal from the remote controller and enter Failsafe mode:

1. The remote controller is powered off.
2. The aircraft has flown out of the effective communication range of the remote controller.
3. There is an obstacle obstructing the signal between the remote controller and the aircraft, essentially reducing the distance the signal can travel.
4. There is interference causing a signal problem with the remote controller.

Upon completion of mission the PIC will log information about the flight while the VO advises those in the area that the mission is complete, removes any signage and begins breakdown of the UA.

APPENDIX B – USER'S MANUAL FOR UA (DJI Phantom 2)

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APPENDIX C – USER'S MANUAL FOR UA (3DR X8+)

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