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

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

July 20, 2015

Exemption No. 12084
Regulatory Docket No. FAA–2015–0385

Mr. Robert B. Dreer
821 Briarhill Lane
Traverse City, MI 49686

Dear Mr. Dreer:

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 February 13, 2015, you petitioned the Federal Aviation Administration (FAA) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct photography, videography, inspection of infrastructure, surveying, mapping and photogrammetry, precision agriculture, and scientific and environmental research.

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. The FAA received one individual comment in opposition to the petition and one in support. In granting this exemption, the FAA has determined that the proposed operations can safely be conducted under the conditions and limitations of this exemption. As with exemptions issued to Aeryon Lab, Astraeus Aerial, Clayco, Inc., and VDOS Global, LLC, failure to comply with the document's conditions and limitations is grounds for immediate suspension or rescission of the exemption.

Airworthiness Certification

The UAS proposed by the petitioner are the 3D Robotics IRIS+, X8-M, and Aero−M.

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, Mr. Robert B. Dreer 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

[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.

the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, Mr. Robert B. Dreer 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 3D Robotics IRIS+, X8-M, and Aero−M 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 July 31, 2017, unless sooner superseded or rescinded.

Sincerely,

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

Enclosures

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robert@cherrycapitaldrones.com

February 13, 2015

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

Re: Submission of Request for Determination under Section 333 of the FAA Modernization and Reform Act and Exemptions under 14 C.F.R. Section 11.81

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 ("FMRA"), I, Mr. Robert Dreer hereby request a determination by the Secretary of Transportation authorizing conduct of commercial operations of its UAS for the purposes of photography, videography, inspection of infrastructure, surveying, mapping and photogrammetry, precision agriculture, and scientific & environmental research. Pending a grant of exemption, I will be launching my company, a veteran-owned small business, which will provide a broad spectrum of safe, low-cost, aerial solutions. I will be using UAS manufactured by 3D Robotics (3DR). Operations will be conducted within and under the safeguards outlined herein and as may be established by the FAA under FMRA Section 333(c).

I also petition for exemptions as necessary to effect the determination requested pursuant to FMRA Section 333. The attached documentation includes detailed exemption requests that demonstrate how these exemptions are in the public interest and will maintain at least an equal level of safety to existing regulations. Authorizing me to conduct commercial UAS operations would enhance community education and awareness of UAS. Further, operation of his UAS in these commercial operations are less disruptive, safer, and more cost effective than manned aviation equivalents due to the low altitude environment, given the size, speed and inherent risk of traditional commercial helicopter operations. These commercial operations often occur in the unsafe areas of the height-velocity diagram requiring special precision and skill. I will conduct the commercial UAS operations in a manner that will meet, and in many cases exceed, the current level of safety of commercial helicopter operations. I will employ UAS that are under 10 lbs, have a low noise signature, and carry no volatile fuel, which will limit collateral damage in the event of catastrophic failure. The low expense of operation compared to cost prohibitive manned aviation alternatives allow a greater economic benefit to businesses. For these reasons, granting an exemption under FMRA Section 333(c) is in the public interest. UAS technology used for these commercial purposes benefit the public interest in the following ways:

- Reduces the collateral damage risks to life and property associated with low altitude helicopter operations in undesirable portions of the height-velocity envelope.
- Increased public awareness regarding safe and responsible utilization of UAS.
- Increased economic wellbeing to local businesses via cost reductions.
- Enabling aerial business solutions to be available to a larger market.
- Enhanced agriculture practices resulting in reduced environmental contamination from pesticide/fertilizer runoff and increased crop yields.
- More efficient and frequent inspection of infrastructure due to reduced cost.

Additionally, I commit to hiring appropriately qualified military veterans from the local community whenever possible in future expansions. I appreciate your careful consideration in granting this exemption.

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Table of Contents

I. Regulations – Exemptions requested

Pursuant to 14 C.F.R. § 11.81(e), I, Robert Dreer seek exemption from the below mentioned regulations and provide reason as to why the exemption should be approved based on the level of safety at least equal to that of which the rules require.

- **14 C.F.R. Part 21 Subpart H – Airworthiness Certificates**
  - **Establishes:** The procedural requirements for the issuance of airworthiness certificates as required by 14 C.F.R. § 91.203(a)(1)

  Given the small size of the UAS and the safeguards that will be taken as outline below, 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 with consideration "of the size, weight, speed, operational capability, and proximity to airports and populated areas of the particular UAS."

- **14 C.F.R. § 45.23(b) – Aircraft Marking and Identification Requirements**
  - 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.

  My UAS will ensure compliance with § 45.29(f) to meet the intent of the regulation by displaying the registration number in the largest practicable lettering.

- **14 C.F.R. 61.113 (a)(b) and 61.133(a)(1)(ii) – Private and Commercial Pilot Privilege and Limitations**

- **14 C.F.R. § 61.113:** (a) Except as provided in paragraphs (b) through (g) of this section, no person who holds a private pilot certificate may act as pilot in command of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as pilot in command of an aircraft. (b) A private pilot may, for compensation or hire, act as pilot in command of an aircraft in connection with any business or employment
- **14 C.F.R. § 61.133**: (a) Privileges – (1) General. A person who holds a commercial pilot certificate may act as pilot in command of an aircraft – (ii) For compensation or hire, provided the person is qualified in accordance with this part and with the applicable parts of this chapter that apply to the operation.

Currently, there are no applicable areas identified for UAS in either the private or the commercial sector and therefore an exemption is required to conduct commercial operations. As flight operations will be conducted with an abundance of caution following the procedure outline below, my operations will achieve an equivalent level of safety for each individual flight especially when compared to commercial flights identified in Part 61 when originally developed. My operation will be conducted with pilots who hold, at a minimum, a private certificate of any category or class and a 3rd class medical. I, Robert Dreer, a commercial pilot and CFI, will oversee the flying program.

- **14 C.F.R. 91.7(a) – Civil Aircraft Airworthiness**
  - No person may operate a civil aircraft unless it is in an airworthy condition.

Currently there is no airworthiness certificate for 3DR UAS. Daily pre and post flight inspections will be accomplished in accordance with manufactures maintenance manual(s) and guidance. During flight, the PIC will adhere to § 91.7(b) and abort air operations immediately upon identification of an in-flight emergency or other unsafe condition. By complying with procedures outlined by the manufacturer, an equivalent level of safety will be achieved.

- **14 C.F.R. 91.9(b) Civil aircraft flight manual, marking, and placard requirements**
  - (b)(2) prohibits operation of U.S.-registered civil aircraft unless there is available in the aircraft a current approved Airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof.

By keeping all operating documents, manuals, authorizations and exemptions in a binder co-located with the GCS, I can meet the intent of the regulations and therefore achieve an equivalent level of safety.

- **14 C.F.R. 91.109(a) – Flight Instruction**
  - 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.

The majority of sUAS by design are developed with single operational control through the use of pre-determined GPS enabled waypoints programmed before or during flight in

addition to the use of a single hand held transmitter or control station controlled by the PIC. The design does not allow for dual controls during flight training and therefore the exemption is requested to train operators, build experience, and maintain proficiency. An equal level of safety will be achieved by conducting all training in stile environment. Training sessions will be accomplished separately from flights conducted for compensation or hire.

- **14 C.F.R. 91.119 (c) – Minimum Safe Altitudes**
  - Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes: (b) Over any congested area of a city, town, or settlement, or over any open air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft. (c) Over other than congested areas. An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure. (d) Helicopters, powered parachutes, and weight-shift-control aircraft. If the operation is conducted without hazard to persons or property on the surface— (1) A helicopter may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section, provided each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA.

Commercial UAS operations will be conducted at or below 400 ft. AGL. Given the size, weight and lack of fuel; combined with operation limitations listed below, the operation will be conducted with a greater level of safety than exists with current manned aviation operations.

- **14 C.F.R. 91.121 – Altimeter Settings**
  - Each person operating an aircraft shall maintain the cruising altitude or flight level of that aircraft, as the case may be, by reference to an altimeter that is set, when operating…

SUAS are equipped with Global Positioning System (GPS), which provide altitude and geo-location data to the operator without utilizing an altimeter. Due to this fact, an exemption is required. GPS are precise within a few feet and combined with fail-safes and a visual observer the operation will meet an equivalent level of safety.

- **14 C.F.R. 91.151(a) – Fuel Requirements for Flight in VFR Conditions**
  - No person may begin 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;

This regulation is written based on the capabilities of a traditional aircraft, which have flight times of several hours or greater; therefore, with the majority of sUAS which have flight times of only an hour or less, this regulation would effectively deny the ability of the air vehicle to operate.

The 3DR UAS display a visual and emit an audible low battery alert at 25% at which time the UA will automatically engage the landing sequence. Based upon that safeguard and the small operational area in VLOS, the operation can meet an equivalent level of safety.

- **14 C.F.R. 91.405(a), 91.407(a)(1), 91.409(a)(2) and 91.417(a) & (b) – Maintenance Inspections**
  - **91.405(a) States**: Each owner or operator of an aircraft—(a) Shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter
  - **91.407(a)(1) States**: (a) No person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless—(1) It has been approved for return to service by a person authorized under § 43.7 of this chapter
  - **91.409(a)(2) States:** (a) Except as provided in paragraph (c) of this section, no person may operate an aircraft unless, within the preceding 12 calendar months, it has had—(2) An inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter. No inspection performed under paragraph (b) of this section may be substituted for any inspection required by this paragraph unless it is performed by a person authorized to perform annual inspections and is entered as an ‘‘annual’’ inspection in the required maintenance records.
  - **91.417(a) & (b) States:** (a) Except for work performed in accordance with §§ 91.411 and 91.413, each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section: (paragraphs 1 (i – iii), 2 (i – vi)); (b) The owner or operator shall retain the following records for the periods prescribed: (paragraphs 1 – 3)

Because 3DR UAS at present do not have airworthiness certificates, these regulations do not apply and therefore an exemption is required. Pre/Post flight inspections and maintenance will be conducted in accordance with the manufacturer’s guidance as stated in the operations manual. In addition, to meet the intent of these regulations, I will maintain daily logs of pre and post flight inspections. If maintenance is required, a dedicated test flight will be conducted to ensure safety before resuming commercial operations. All inspection, maintenance and alterations will be documented and maintained in a record. These actions will meet the intent of the regulations from which exemption is being requested and lead to an equivalent level of safety.

II. Commercial Operator/Operation

Initially, I will be the sole operator of the exempted UAS, with subsequent hiring of employees to follow. I have approximately ten years of experience operating UAS in restricted and tactical airspace supporting military and civilian operations. I received my training in the US armed

forces and my military occupational specialty is 15W, UAS Operator. During my time military service, I conducted UAS operations in Arizona, Texas, California, and Iraq. Following military service, I joined the private sector, conducting UAS operations in Utah and Afghanistan. I am certified by the manufacturer of several high-end UAS, namely the AAI Shadow and Aerosonde Mk 4.7. I am a UAS subject matter expert and am currently teaching in academia. I hold a commercial pilot certificate, airplane, single and multi-engine land and have approximately 20 hours of flight and ground training toward a helicopter add-on. Additionally, I hold a flight instructor certificate, SEL and Instrument, currently working on adding multi-engine. I possess 2nd class medical. I request that my future employees be exempt from§ 61.113 (a) and (b) allowing operations of my UAS for compensation or hire, possessing only a private pilot certificate and 3rd class medical. A private pilot certificate will demonstrate a safe and equivalent level of aeronautical safety, judgment, security and responsibility to operate my UAS.

I am knowledgeable in human factors awareness; crew resource management; and risk management. I will apply those principles to my operation.
For each flight, my employees or I:

- Will contact the controlling air traffic organization to issue a NOTAM.
- Will obtain a preflight briefing from a pilot briefer, DUATS, or similar means.
- Will conduct a comprehensive worksite inspection and analysis, identifying limits of customer property or authorized access areas.
- Will conduct preflight planning in accordance with Section 91.103 *Preflight Action.*
- Will operate in those areas only with the consent of the landowner or designated representative.
- Will identify potential obstructions or other hazards to safe operation.
- Will clear the area of personnel or bystanders that are non-essential to the operation, maintaining at a minimum, 500 feet away from non-participating persons.
- Will conduct a preflight safety briefing to Visual Observer (VO) and participating persons.
- Will at all times yield to manned air traffic.
- Will operate within VLOS of both PIC **and** VO during daylight hours only.
- Will maintain voice communications with VO and participating persons.
- Will operate under Class D visual flight rules, defined as 500 feet below and 2000 feet horizontal from clouds with a minimum of 3 statute miles of visibility.
- Will not exceed an altitude 400 feet AGL as determined by the installed GPS.
- Will keep operating documents, manuals, authorizations and exemptions in a binder co-located with the GCS.
- Will immediately terminate flight, in the safest manner possible, when safety to persons or property become compromised.
- Will terminate flight, in the safest manner possible, when unable to comply with these limitations or any other limitations granted as part of this exemption.

In order to remain at an altitude at or below 400 feet AGL, relief is needed from Section 91.119 (c) and (d). By following these operating standards, the commercial operation will meet an equivalent level of safety to the regulation in which relief is sought.

III. Unmanned Aircraft System

I seek an exemption to operate the 3DR line of UAS. The IRIS+ is the primary aircraft in our operation for which we seek exemption. We will be acquiring the 3DR X8-M and Aero-M UAS at a later time and so wish to include those platforms in this exemption as well. The 3DR UAS utilize a common autopilot system and common ground control station software (GCS). The UAS will be flown via a combination of RC control, Tablet GCS, or PC-based GCS. The IRIS+ and X8-M are GPS equipped, multirotor helicopters. The IRIS+ is a quad-type utilizing four rotors. The X8-M is a quad-type utilizing eight rotors in an "X" configuration. The Aero-M is a GPS equipped, lightweight, foam, fixed wing aircraft with a minimum airspeed of 22 MPH and a max airspeed of 45 MPH. The UAS are powered by lithium-polymer batteries. The UAS will carry Go Pro and other small point and shoot cameras.

The IRIS+ and X8-M UAS have the capability to land at its current location with a dedicated switch. The UAS also has several fail-safes for loss of RC signal, loss of GPS, and low battery as outlined in the respective Operation Manuals. The UAS display a visual and emit an audible low battery alert at 25% at which time the UA will automatically engage the landing sequence. Based upon that safeguard, I request exemption from Section 91.151(b) Fuel requirements for flight in VFR conditions.

The UA also has a geofence function, which will be programmed for a maximum altitude of 400 feet AGL and within the lateral boundaries of the worksite. The UAS, except for the Aero-M, will not have an installed barometric altimeter and will rely on GPS to determine altitude and speed. Given the aircraft will be operated within VLOS with the aid of a VO, I believe the operation can be conducted with an equivalent amount of safety and therefore request exemption from Section 91.121

Given the size, weight, speed, and controlled operating area associated with the UA to be utilized, an exemption from 14 CFR part 21, Subpart H (Airworthiness Certificates) and § 91.203 (a) and (b) is requested. I seek exemption from § 45.23 *Marking of the aircraft.* The UA will display the registration number in the largest practicable lettering. He wished to be exempt from § 91.405(a), 91.407(a)(1), 91.409(a)(2) and 91.417(a) and (b) *Maintenance inspections* will be conducted according to operations manual and prudent judgment as previously outlined to determine the integrity and safety of the UAS and associated equipment. Further, I require relief from 91.7(a), which prohibits the operation of an aircraft without an airworthiness certificate and 91.9(b) (2) requiring an approved flight manual in the aircraft. The UAS will not be operating with an airworthiness certificate therefore, this would be inappropriate. The UAS are too small to carry the operating documents so an equivalent amount of safety can be achieved through keeping the operating documents and manuals at the GCS.

IV. UAS Pilot in Command (PIC)

Under § 61.113 (a) and (b) private pilots are limited to non-commercial operations, however I can ensure my operation will achieve an equivalent level of safety as current regulation because my UAD do not carry any pilots or passengers. A commercial pilot certificate will not ensure RC piloting ability, as the psychomotor skills are different. The inherent risks of operating a UAS are far less than in the commercial activities outlined in 14 CFR part 61, et seq., thus I request an exemption from § 61.113 *Private Pilot Privileges and Limitations: Pilot in command.* All UAS PICs will have logged, in accordance with 61.51 (b), appropriate training on the UA consisting of 25 hours as UAS rotorcraft, 10 hours multirotor UAS or 25 hours as UAS airplane, 10 hours single-engine as appropriate. PICs will maintain recent flight experience on the UAS. Training and experience flights will be conducted separate from commercial operations.

PIC Training will consist of:

- Pre-flight Tasks
  - Assembly and inspection of UAS
  - Set-up and configuration of RC radio and GCS
  - System checks
- Mission Tasks
  - Takeoff and landing
  - Manual flight modes
  - Autonomous flight modes
  - Emergency Procedures
- Post-flight Tasks
  - Inspection
  - Shutdown
  - Disassembly
- Other Tasks
  - Regulations
  - Operating limitations
  - Flight planning

V. Public Interest

Given the above stated evidence, procedures, and precautions; I feel that operating my UAS commercially for the purposes of photography, videography, inspection of infrastructure, surveying, mapping and photogrammetry, precision agriculture, and scientific & environmental research will ultimately be in the public interest. These operations, when executed with prudence, will exceed the current level of safety as the regulations from which I seek exemption. My operation will allow greater access to commercial aerial services that were not previously economically feasible for many firms. This will provide a much needed economic uplift to the community and hence the public. My operation will be conducted with less risk of collateral damage to persons and property while limiting disruptive noise pollution associated with low altitude aviation operations.

A major factor to consider regarding the public interest is the current state of UAS operations in the US. As a manned aviator, the need to integrate UAS into the national airspace system in a safe, deliberate manner, is always at the forefront of my mind. While not all, many individuals

operate UAS and model aircraft in a reckless manner out of either ignorance or carelessness, as evidenced by the increasing reports of manned-unmanned incursions and incidents such as the DJI Phantom that recently crashed on the White House lawn. As the technology becomes more readily available, the challenges will intensify. By allowing commercial operations, it will enable communities to become educated in the proper use of this technology. As an educator, I am already working to foster positive awareness and safe, responsible utilization of UAS technology. Granting my exemption will result in a direct extension of these efforts, which is in the public interest.

VI. Summary

Pursuant to Section 333 of PL 112-95 commonly known as the "FAA Modernization and Reform Act of 2012", Robert B. Dreer, hereby applies for authorization to conduct commercial unmanned aerial systems (UAS) operations for the purposes of photography, videography, inspection of infrastructure, surveying, mapping and photogrammetry, precision agriculture, and scientific & environmental research.

Rules in which I seek exemption:

- 14 C.F.R. Part 21 Subpart H
- 14 C.F.R. § 45.23(b)
- 14 C.F.R. § 61.113 and 61.133(a)(1)(ii)
- 14 C.F.R. § 91.7(a)
- 14 C.F.R. 91.9(b)
- 14 C.F.R. § 91.103
- 14 C.F.R. § 91.109(a)
- 14 C.F.R. § 91.119
- 14 C.F.R. § 91.121
- 14 C.F.R. § 91.151(a)
- 14 C.F.R. § 91.405(a)
- 14 C.F.R. § 91.407(a)(1)
- 14 C.F.R. § 91.409(a)(2)
- 14 C.F.R. § 91.417(a) & (b)

Throughout this exemption request, I have shown how my expertise and knowledge with UAS technology will ensure the public's best interest is at hand and how my operation will aid in safely integrating civil UAS into the national airspace system.