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

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

September 8, 2015

Exemption No. 12787
Regulatory Docket No. FAA−2015−1845

Mr. Kevin D Hubbard
Ravenwood HD Services, LLC
13870 East River Vista Circle
Palmer, AK 99645

Dear Mr. Hubbard:

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 2, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Ravenwood HD Services, LLC (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial survey and photography.

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

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

Airworthiness Certification

The UAS proposed by the petitioner is a 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, Ravenwood HD Services, 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)

[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.

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

Conditions and Limitations

In this grant of exemption, Ravenwood HD Services, 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 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 September 30, 2017, unless sooner superseded or rescinded.

Sincerely,

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

Enclosures

Kevin D Hubbard
Ravenwood HD Services, LLC
13870 East River Vista Circle
Palmer, AK
99645
(907)631-8791
Ravenwood.HD.llc@gmail.com

April 2, 2015

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

Re: Request for Exemption Per PL 112-95 § 333 from 14CFR 21 Part H, 14CFR 61.3, 14CFR 61.113, 14CFR 91.119, 14CFR 91.121, 14CFR 91.151, 14CFR 91.405, 14CFR 91.407, 14CFR 91.409, 14CFR 91.417

Please consider this a request for an exemption of the above applicable sections of 14 CFR for Ravenwood HD Services, LLC (hereafter 'Ravenwood') for the purpose of conducting commercial aerial survey and photography operations with its small Unmanned Aircraft System (sUAS) within United States airspace. The employment of sUAS platforms for these missions should provide the FAA with good cause to find that these operations enhance safety by eliminating the need to use conventional aircraft in the sometimes unique environments where a small Unmanned Aerial Vehicle (sUAV) would be particularly adept, but a conventional aircraft may pose a hazard to its crew and those on the ground.

Ravenwood requests exemption from the following applicable regulations, pursuant to the Administrator's authority to grant exemptions contained in 49 U.S.C. § 106(f), 40113, and 44701:

14 CFR 21 Part H
14 CFR 61.3
14 CFR 61.113,
14 CFR 91.119,
14 CFR 91.121,
14 CFR 91.151,
14 CFR 91.405,
14 CFR 91.407,
14 CFR 91.409,
14 CFR 91.417

CORPORATE EXPERIENCE

(14CFR 61.3 and 14CFR 61.113)

The operational staff of *Ravenwood* is comprised of aviation professionals with varying degrees of experience. All *Ravenwood* operators have at a minimum passed an FAA Private Pilot Ground School course, completed the *Ravenwood sUAS training course,* and hold at least an FAA third class flight physical. The principal (Chief) Operator is an FAA-trained air traffic controller with more than 22 years' experience in aviation safety. He has been a certified professional controller at 3 Air Traffic Control Towers and Multiple radar facilities. He also has passed an FAA part 141 ground school at the University of Alaska Anchorage (UAA)(which included 2 hours in a full motion flight simulator) and is pursuing a Private Pilot Certificate and a Bachelor of Science degree in aviation management. He has more than 100 hours of flight time in small aircraft in Alaska, although none of it was as Pilot-In-Command. (PIC) He also completed the first 'Introduction to Unmanned Aircraft Systems' course offered by UAA. A complete resume is available upon request. This combination of experience and education provides a greater level of understanding and safety for the operation of a sUAS in the National Airspace System (NAS) than simply possessing a Private Pilot Certificate.

OPERATIONS

Ravenwood operations utilize a sUAS in a manner that provides services not offered by manned aircraft and enhances the level of safety beyond which can be accomplished by manned aircraft. Examples of the proposed aerial photography operations include real estate, insurance damage assessment, and incident/accident documentation. Most operations restrict the use of the sUAS to a small area typically encompassing a limited number of residential and commercial properties at a time. The structures on these properties provide sufficient protection from the sUAV, and photography can be completed with much less risk than what would be incurred in a manned aircraft operation at low altitudes. Our intended film production operation would typically include both photography and videography for commercial purposes including wedding and corporate events. These events are restricted to only the invited participants and are closed to the general public, providing the opportunity to operate only in an area where informed, consenting participants and personnel are present. *Ravenwood* will be able to provide a level of safety equal to or greater than the manned aircraft that would typically provide these services.

Finally, our survey operation includes the orthomosaic mapping of agriculture, construction, and industrial sites utilizing our sUAS rotorcraft flying pre-programmed grids that can be interrupted and returned to a safe landing zone by our operators at any time. Currently these operations are executed by manned aircraft carrying hundreds of pounds of fuel and equipment flying at low altitudes and speeds in excess of 75 miles per hour. Our operation would greatly increase the level of safety, replacing manned aircraft with a sUAV

weighing less than 7.5 pounds which carries no fuel, and restricted to speeds no greater than 40 knots. These sites are areas that can readily be secured by *Ravenwood* personnel and will not provide any additional risk to the general public.

Flight Safety

All *Ravenwood HD Imaging* operations will be performed by *Ravenwood HD Services llc* trained and certified operators that have at minimum passed an FAA Private Pilot Ground School and hold a current FAA class 3 medical certificate. Operators, Visual Observers and where necessary Site Security Coordinators will participate in a preflight safety briefing for each mission. The mission will be executed only after a safety assessment has been completed and Threat/Error Mitigations are in place. Any operations under the exemption will be conducted in accordance with the *Ravenwood Flight Operations Manual*.

Aircraft

Ravenwood HD Imaging will operate variations of the 3D Robotics X8+, an eight motor rotorcraft. The X8+ is a commercially available, off-the-shelf sUAS. The X8+ is a rotorcopter configuration and will weigh no more than 7.5 pounds. The X8+ will operate no faster than 40 knots groundspeed. The X8+ is agile, having the ability to hover, and move about its three axes simultaneously. The X8+ will be operated below 400 feet Above Ground Level (AGL) and continuously within the operator's line of sight, so as not to create a hazard to users of the NAS or public. The X8+ is equipped with failsafe protocols that can either return the aircraft to a predetermined point and land, or land immediately if that action has been deemed safer by the operator in the preflight planning. Because of the X8+'s specifications and flight characteristics, it poses no threat to national security.

Limitations

The limitations and conditions that *Ravenwood HD Services, llc* agrees to be bound to include:

1. The X8+ takeoff weight will be less than 7.5 lbs. unless operating under an approved modification.
2. The X8+ will be operated at less than 40 knots groundspeed.
3. Flights will be operated within unaided visual line of sight of an operator and observer.
4. The X8+ will never be operated directly over a person, and will remain at least 100 feet from all persons.
5. All flights will be conducted in daylight, Visual Flight Rules (VFR) conditions.
6. Flights will be operated at an altitude of no more than 400 feet AGL.
7. Maximum total flight time for each operational flight will be 30 minutes.
8. Flights will be terminated at 20% battery power reserve should that occur prior to 30 minutes.
9. Minimum crew for each operation will consist of the sUAS Operator, the Visual Observer and may include a security coordinator.
10. The sUAS operator will be a *Ravenwood HD Services* trained operator and will maintain at least an FAA third class medical certificate. The observer will be a *Ravenwood HD Services* trained observer.
11. A briefing will be conducted in regard to the planned sUAS operation prior to each flight. All *Ravenwood* personnel who will be participating in that flight shall be present for the preflight briefing.
12. When necessary, and at least 72 hours prior to flight, the operator will file FAA Form 7711-1, or its equivalent, with the appropriate Flight Standards District Office.
13. Observer and Operator will at all times be able to communicate by voice with each other.
14. When necessary, permission from relevant property owners will be obtained.
15. If the sUAS suffers a 'lost link', the X8+ will perform the predetermined flight maneuver to land as soon as practical as outlined in the preflight briefing.
16. The sUAS will have the capability to abort a flight in case of unpredicted obstacles or emergencies.
17. All accidents and incidents shall be recorded in the aircraft log and reported in accordance with FAA directives.

X8+ CONTROL

The control of the X8+ will be through a Radio Transmitter and Receiver operating on frequency 915 Mhz. This frequency is FCC approved and provides more than adequate range for operations within line of sight of the operator. The X8+ sUAS is also equipped with flight telemetry radios for semi-autonomous operation using highly precise GPS data, while maintaining a constant link between the X8+ vehicle and the ground station. The semi-autonomous mode of the X8+ is similar to a small manned aircraft operating with a 3 axis autopilot; operator input is still a function of the system. (Lost link procedures still apply)

X8+ PAYLOAD

The X8+ manufacturer's payload capacity is listed at 800 grams, which equals 1.76 lbs. The X8+ vehicle weight with battery is listed at 2,560 grams which equals 5.64 lbs. Specific payload configurations will result in variable payloads. Every flight payload will be documented in the aircraft log. Without a manufacturer's approved modification, the X8+ will not be operated outside parameters set forth in the manufacturer's handbook.

AIRWORTHINESS CERTIFICATION

The X8+ operated by *Ravenwood HD Imaging* has a manufacturer's maximum takeoff weight of 3,360 grams (7.50 lbs.) fully loaded. It carries neither a pilot nor passenger, carries no explosive materials or flammable liquid fuels, and operates exclusively within visual line of site of the operator. Operations under this exemption will be tightly controlled and monitored by the operator. The X8+ has the capability to safely fly and navigate after a total loss of power to one motor; this would be catastrophic to a typical 4 motor rotorcraft. By nature of its operation, the X8+ provides a greater degree of safety to the public and property owners than conventional operations conducted with airworthiness certificates issued under 14CFR Part 21.

NATIONAL SECURITY

There is no credible threat to national security posed by the UAS, due to its size, speed of operation, location of operation, lack of explosive materials or flammable liquid fuels, and inability to carry a substantial external load.

FLIGHT CREW

(14CFR 21 Part H)

All flight crew members will successfully complete the *Ravenwood HD Services* training program and operators will maintain at least an FAA 3rd class medical certificate. The *Ravenwood HD Services* training program has been developed referencing the curriculum already in place by the U.S. Department of Interior (DOI) for training their sUAV pilots. This curriculum is currently accepted by the FAA as valid for the initial qualification of sUAS operators. The full *Ravenwood HD Services llc* training program is proprietary in nature and is available to the Administrator upon request.

The *Ravenwood* Operator will remain the individual in charge of each flight and will not transfer responsibility for operational control of the X8+ aircraft to any other person, unless the flight is specifically for training purposes and not for hire. Any flight for training purposes will include a visual observer that is fully qualified for that position.

The Visual Observer will be trained in accordance with the *Ravenwood HD Services llc* training program and will possess a current valid driver's license issued in the United States.

Ravenwood HD Services llc requests an exemption from 14CFR 21 Part H until such a time that it has been established that the *Ravenwood HD Services llc* training program is capable of full compliance with the regulation (Number of successful graduates, certification of instructors, etc).

CREW RESOURCE MANAGEMENT (CRM)

All *Ravenwood* flight crew members will actively practice CRM in accordance with FAA guidelines. Further guidance and details are covered in the *Ravenwood HD Services* training program.

PREFLIGHT ACTION

Prior to each flight, the operator must conduct a pre-flight inspection and determine the sUAS is in a safe condition for 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 X8+, the aircraft is prohibited from operating until the necessary maintenance has been performed and the X8+ is found to be in a condition for safe flight.

After the pre-flight inspection, the operator will conduct a pre-flight safety briefing with the observer and all other participants.

MINIMUM SAFE ALTITUDES
(14CFR 91.119)

Ravenwood HD Services llc requests authority to operate at altitudes up to but not exceeding 400 feet AGL. *Ravenwood HD Services llc* will maintain a safe operating area in order to protect structures and people not associated with the operation. At no time will the X8+ be operated directly over a person. The X8+ will be operated at least 100 feet from all persons. The X8+ will be continuously operated at an altitude which will allow a safe descent and recovery should a mechanical issue arise.

ALTIMETER SETTING
(14CFR 91.121)

The X8+ utilizes a highly accurate GPS altimeter. An equivalent or greater level of safety is provided during preflight where the *Ravenwood* operator will compare the GPS altimeter with the pressure altimeter for the nearest FAA METAR report and verify accuracy to within 50 feet as indicated on the applicable VFR sectional chart.

FUEL REQUIREMENTS
(14 CFR 91.151)

The X8+ is powered by a battery, which provides up to 30 minutes of powered flight. Because of the absence of flammable operating fluids, an X8+ does not pose the same level of risk as a conventional aircraft. All *Ravenwood* operators will terminate flights when remaining battery power level reaches 25%, or 30 minutes flight time is reached, whichever comes first after takeoff.

Since no flights conducted by *Ravenwood* will require traditional petroleum based fuel, and those flights will be for less than 30 minutes, *Ravenwood* requests relief from 14CFR 91.151.

X8+ MAINTENANCE
(14CFR 91.405, 14CFR 91.407, 14CFR 91.409, 14CFR 91.417)

Ravenwood HD Services llc requests exemption from 14CFR 91.405, 14CFR 91.407, 14CFR 91.409, 14CFR 91.417.

Ravenwood HD Services llc will conduct all maintenance on the X8+ in accordance with the flight operations manual, pilot operating handbook, and any guidance received from the manufacturer. *Ravenwood HD Services llc* will abide by all notices from the manufacturer governing the maintenance, preventive maintenance, and alterations of the X8+.

All maintenance will be conducted by a *Ravenwood* associate according to guidance from the manufacturer.

There is no certified FAA inspection process for sUAS's, therefore all inspections will be conducted by *Ravenwood* associates in accordance with manufacturer's guidelines. These inspections will be conducted and documented after any maintenance and before every flight. A functional flight test will be conducted after maintenance and before any flight for hire.

Summary

Ravenwood HD Services llc intends to comply with every applicable regulation to the operation of the X8+ sUAS. Each request for exemption has been made with the understanding that *Ravenwood* is able to conduct operations that are at least as safe as or safer than those commercial operations that currently are conducted by manned aircraft.

Ravenwood's proposed exemptions and operational limitations are very closely aligned with other exemptions already granted, and also with pending proposed 14 CFR § 91.107, which is specific to the operation of 'micro' unmanned aircraft. The proposed 14 CFR § 91.107 has been attached for reference.

Although the X8+ is above the weight restrictions for the proposed rule, it is applicable in nearly every other instance. In the event that 14 CFR § 91.107 becomes effective, *Ravenwood HD Services llc* will be submitting a request to operate within those guidelines with minor exemptions to be addressed at a later date.

I appreciate your assistance with this process, as I am aware of the massive undertaking that these exemption requests are. Please contact me at your convenience with any questions regarding this request.

Thank You,

Kevin D. Hubbard
Managing Member and Chief Operator
Ravenwood HD Services llc

Attached: Proposed 14 CFR § 91.107, per UAS America Fund, llc
X8+ Online Operating Manual: http://3drobotics.com/wp-content/uploads/2015/04/X8-Operation-Manual-vC.pdf

UAS America Fund LLC

Micro Unmanned Aircraft

Proposed Part 107

§107.1 Applicability.

This part prescribes rules governing the operation of micro unmanned aircraft in the United States. For purposes of this part, a micro unmanned aircraft means a device capable of sustaining its own powered flight in the air, that is operated without the possibility of direct human intervention from within or on the device, and that:

a) Weighs 3 pounds or less gross takeoff weight, including power source and payload;
b) Is powered by an electric battery or other non-combustion power source;
c) Is operated for a business, commercial, scientific, academic, research or other non-recreational purpose; and is not a "model aircraft" subject to Public Law 112-95 § 336.

§107.3 Waivers.

No person may conduct operations that require a deviation from this part except under a written waiver issued by the Administrator.

§107.5 Careless or reckless operations.

a) No person may operate a micro unmanned aircraft in a careless or reckless manner so as to endanger the life or property of another.
b) No person may allow an object to be dropped from a micro unmanned vehicle if such action creates a hazard to other persons or property.

§107.7 Certification, registration and other requirements.

c) Notwithstanding any other section pertaining to certification of aircraft or their parts or equipment, micro unmanned aircraft and their component parts and equipment (including ground station or radio control systems) are not required to meet the airworthiness certification standards specified for aircraft or to have certificates of airworthiness.
d) Notwithstanding any other section pertaining to registration and marking of aircraft, micro unmanned aircraft are not required to be registered or to bear markings of any type, except that the name, address, and telephone number of the owner or operator shall be affixed to at least two externally visible locations on the micro unmanned aircraft.
e) Notwithstanding any other section, micro unmanned aircraft operated pursuant to this part are not subject to any other federal aviation regulation, including any provision of parts 21, 45, 47, 61, or 91.

§107.9 Daylight operations.

a) No person may operate a micro unmanned aircraft except between the hours of sunrise and sunset.
b) Notwithstanding paragraph (a) of this section, micro unmanned aircraft may be operated during the twilight periods 30 minutes before official sunrise and 30 minutes after official sunset, or, in Alaska, during the period of civil twilight as defined in the Air Almanac, if:
    1) The micro unmanned aircraft is equipped with an operating anti-collision light visible for at least 3 statute miles; and
    2) All operations are conducted in uncontrolled airspace.

§107.11 Operation near aircraft; right-of-way rules.

a) Each person operating a micro unmanned aircraft shall continually maintain vigilance so as to see and avoid aircraft and shall yield the right-of-way to all manned aircraft.
b) No person may operate a micro unmanned aircraft in a manner that creates a collision hazard with respect to any aircraft.
c) Each person operating a micro unmanned aircraft, upon hearing engine, rotor, or propeller sounds from an aircraft uninvolved in the operation, shall take precautionary steps to identify the altitude and flight direction of the uninvolved aircraft and yield right of way.

§107.13 Operating limitations: altitude, airspace and locations.

a) No person may operate a micro unmanned vehicle at an altitude greater than 400 feet above ground level (AGL).
b) No person may operate a micro unmanned vehicle within Class B, Class C, or Class D airspace or within the lateral boundaries of the surface area of Class E airspace designated for an airport, unless that person has prior authorization from the ATC facility having jurisdiction over that airspace.
c) No person may operate a micro unmanned aircraft within 5 nautical miles of the geographic center of an airport as denoted on a current FAA-published aeronautical chart unless that person has prior written authorization from that airport's management. This restriction does not apply to airports that are closed or abandoned.
d) No person may operate a micro unmanned aircraft beyond his or her visual line of sight (VLOS). During the flight operation, the operator must be able to view the micro unmanned aircraft at all times using his or her own natural vision (which includes the use of vision corrected by standard eyeglasses or contact lenses but excludes the use for flight navigation purposes of vision-enhancing devices such as binoculars, night vision goggles, powered vision magnifying devices, or video glasses designed to provide a "first person view" from a camera mounted on the micro unmanned aircraft), and must visually scan the surrounding airspace to see and avoid other air traffic. The maximum operating distance of a micro unmanned aircraft system from the operator under this subsection is 2,640 feet, regardless of the visual acuity of the operator.
e) No person may operate a micro unmanned aircraft closer than 100 feet from any persons uninvolved in the operation.
f) No person may operate a micro unmanned aircraft over an open-air assembly of persons.
g) No person may operate a micro unmanned aircraft in special use airspace designated under Part 73 unless that person has permission from the using or controlling agency, as appropriate.
h) No person may operate a micro unmanned aircraft over privately-owned property without the express or implied permission from the property owner, tenant in possession, or an authorized representative thereof.
i) No person may operate a micro unmanned aircraft system within 5 nautical miles of any forest fire without authorization from the incident commander.
j) Prior to operating a micro unmanned aircraft under this part, the operator shall become familiar with all pertinent information concerning the proposed operational location, including but not limited to review of relevant NOTAMs.
k) Any person intending to operate a micro unmanned aircraft within one mile of any active emergency shall first check for any NOTAMs with respect to restrictions on operations in that location.

§ 107.15 Meteorological conditions.

All flights under this part must be conducted under visual meteorological conditions. A micro unmanned aircraft may not be operated under this part 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 operator.

§107.17 Operating limitations: ground speed.

No person may operate a micro unmanned aircraft in excess of 40 knots ground speed.

§107.19 Operator qualifications.

a) An operator of a micro unmanned aircraft system under this part must be at least 18 years of age.
b) No person may operate a micro unmanned aircraft system under this part without first passing the FAA private pilot written airman knowledge test administered by an FAA-accredited pilot school or test center. Prior to any operation under this part, the operator shall send written notification to the FAA evidencing the test results together with the operator's name and contact information, which submission the Administrator will acknowledge in writing as constituting the operator's micro unmanned aircraft pilot certificate for purposes of 49 USC § 44711. This subsection shall not apply to micro unmanned aircraft systems operated as public aircraft.
c) The FAA may pursue investigation and enforcement procedures set out in part 13 with respect to the operator of a micro unmanned aircraft systems, including potential suspension or revocation of a micro unmanned aircraft pilot certificate held by its operator.
d) Any other FAA pilot certificate that has as a requisite a written airman knowledge test may, if said certificate is current and in good standing, serve as a micro unmanned aircraft pilot certificate under subsection (b) even if the operator is unable to provide evidence of his or her written test results. Such pilot certificates will constitute the operator's micro unmanned aircraft pilot certificate for purposes of 49 USC § 44711 and part 13.
e) No person shall operate a micro unmanned aircraft for hire or for a commercial purpose (other than research and development activates relating to the micro unmanned aircraft or its related systems and components), without first undertaking and documenting the following steps to gain experience and proficiency with the micro unmanned aircraft model:
    1) Review of the micro unmanned aircraft manufacturer's operating manuals and any instructional videos provided by the manufacturer.
    2) At least 5 hours of total operating flight time; and
    3) At least 25 takeoff-and-landing sequences.
f) All operations under this part (including training) shall be documented and recorded in a permanent place such as a log book. For the purposes of meeting the minimum requirements of this subsection, each person must record the following information for each micro unmanned aircraft flight:
    1) Date and time
    2) Micro unmanned aircraft type, make, model
    3) Route and boundaries of flight
    4) Total duration of flight
    5) Weather conditions of flight
    6) Number of landings
    7) Total flight time and/or lesson time
    8) Remarks or other pertinent details

§107.21 Alcohol or drugs.

a) No person may operate a micro unmanned aircraft —
    1) Within 8 hours after the consumption of any alcoholic beverage;
    2) While under the influence of alcohol;
    3) While using any drug that affects the person's faculties in any way contrary to safety; or
    4) While having an alcohol concentration of 0.04 or greater in a blood or breath specimen. Alcohol concentration means grams of alcohol per deciliter of blood or grams of alcohol per 210 liters of breath.

§107.23 Insurance.

a) No person shall operate a micro unmanned aircraft for hire or for a commercial purpose (other than for research and development of the micro unmanned aircraft or its systems and components) unless he or she has in effect liability insurance coverage that at a minimum meets or exceeds the minimum motor vehicle insurance coverages for both property damage and bodily injury required in the state in which the operation occurs, and that has been issued specifically to insure against risks of the operation of the micro unmanned aircraft.

b) Insurance coverage to meet the requirements of this part shall be obtained from one or more of the following:
    1) An insurer licensed to issue aircraft accident liability policies in any State, Commonwealth, or Territory of the United States, or in the District of Columbia; or
    2) Surplus line insurers named on a current list of such insurers issued and approved by the insurance regulatory authority of any State, Commonwealth, or Territory of the United States or of the District of Columbia.

c) All person who have operated micro unmanned aircraft under this part must present their logbook, proof of insurance, and evidence of submission to the FAA Administrator their written test results or their valid pilot certificate, or any other record required by this part for inspection upon a reasonable request by-
    a. The Administrator;
    b. An authorized representative of the National Transportation Safety Board; or
    c. Any Federal, State, or local law enforcement officer.

§107.25 Accident reporting.

In connection with any operation under this part, any incident involving $1,000 or more in third-party property damage, and any accident involving any bodily injury, must be reported to the nearest FAA Flight Standards District Office within three business days. Accidents involving a serious injury or death shall be reported to the NTSB pursuant to 49 CFR § 830.