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

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

May 11, 2015

Exemption No. 11547
Regulatory Docket No. FAA–2015–0291

Mr. Dale Lauterback
President
ZuWerks, Inc.
P.O. Box 4736
Glendale, CA 91222

Dear Mr. Lauterback:

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.

The Basis for Our Decision

By letter dated January 31, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of ZuWerks, Inc. (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial imaging and videography for geographical awareness, real estate marketing, and inspections.

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, DJI S800 EVO, and DJI Inspire 1.

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*. In accordance with the statutory criteria provided in Section 333 of Public Law 112−95 in reference to 49 U.S.C. § 44704, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that the requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*, and any associated noise certification and testing requirements of part 36, is not necessary.

The Basis for Our Decision

You have requested to use a UAS for aerial data collection. 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, ZuWerks, 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.

Conditions and Limitations

In this grant of exemption, ZuWerks, 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, DJI S800 EVO, and DJI Inspire 1 when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.

2. Operations for the purpose of closed-set motion picture and television filming are not permitted.

3. The UA may not be operated at a speed exceeding 87 knots (100 miles per hour). The exemption holder may use either groundspeed or calibrated airspeed to determine compliance with the 87 knot speed restriction. In no case will the UA be operated at airspeeds greater than the maximum UA operating airspeed recommended by the aircraft manufacturer.

4. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL). Altitude must be reported in feet AGL.

5. The UA must be operated within visual line of sight (VLOS) of the PIC at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license.

6. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the duties required of the VO.

7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The operating documents must be accessible during UAS operations and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents,

the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operating documents. The operator may update or revise its operating documents. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator or any law enforcement official upon request. The operator must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption. If the operator determines that any update or revision would affect the basis upon which the FAA granted this exemption, then the operator must petition for an amendment to its grant of exemption. The FAA's UAS Integration Office (AFS−80) may be contacted if questions arise regarding updates or revisions to the operating documents.

8. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics, e.g. replacement of a flight critical component, must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.

9. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.

10. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the UAS is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, e.g. inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.

11. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the aircraft and aircraft components.

12. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.

13. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

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

15. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.

16. The UA may not operate within 5 nautical miles of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD) or for airports not denoted with an ARP, the center of the airport symbol as denoted on the current FAA-published aeronautical chart, unless a letter of agreement with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.

17. The UA may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.

18. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the private or controlled-access property.

19. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.

20. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UA to conduct the intended operation and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater.

21. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.

22. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification (N−Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.

23. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under 14 CFR §§ 91.9 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.

24. The UA must remain clear and give way to all manned aviation operations and activities at all times.

25. The UAS may not be operated by the PIC from any moving device or vehicle.

26. All Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:
    a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner ensuring the safety of nonparticipating persons; and
    b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

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

27. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.

28. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS−80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

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

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

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

31. Flight operations may be conducted closer than 500 feet from participating persons consenting to be involved and necessary for the filming production, as specified in the exemption holder's MPTOM.

Unless otherwise specified in this grant of exemption, the UAS, the UAS PIC, and the UAS operations must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 61, and 91.

This exemption terminates on May 31, 2017, unless sooner superseded or rescinded.

Sincerely,

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

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January 31, 2015

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U. S. Department of Transportation
Docket Management System
1200 New Jersey Ave.,
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Subject: Exemption Request Section 333 of the FAA Reform Act of 2012 and Part 11 of the Federal Aviation Regulations from 14 C.F.R. Part 21,

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 and 14 C.F.R. Part 11, ZuWerks Inc., hereafter referred to as "Petitioner", would like to apply for an exemption from the following Code of Federal Regulations (C.F.R) to be allowed commercial operation of lightweight Unmanned Aircraft Systems (UAS) for aerial imaging and video in the Los Angeles Area.

Petitioner current operation of UAS's for commercial purposes has been halted to comply with recently enacted federal aviation regulations pertaining to s UAS's.

14 CFR 21; 14 CFR 91, et seq.; 14 CFR 45.23 (b); 14 CPR 61.113 (a) & (b); 14 CPR 407 (a)(1); 14 CPR 409 (a)(2); 14 CPR 417 (a) & (b). 14 CPR 45.23(b); 14 CPR Part 21; 14CFR61.113(a)&(b); 91.7 (a); 91.9 (b) (2); 91.103(b); 91.109; 91.119; 91.121; 91.151(a); 91.203(a) & (b); 91.405 (a); 91.407 (a) (1); 91.409 (a) (2); 91.417 (a) & (b).

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Public Good

Aerial photography/videography for geographical awareness and for real estate marketing and inspections has been around for a long time through manned fixed wing aircraft and helicopters. But for small business owners, its expense has been cost-prohibitive. Granting this exemption would allow the Petitioner to provide this service at a much lower cost. Further, the small UAS's being utilized in this application will pose no threat to the public given its small size and lack of combustible fuel when compared to larger manned aircraft. The operation of the UAS's will minimize ecological damage and promote economic growth by providing information to businesses & individuals in the Los Angeles Area.

Petitioner has experience in flying both the DJI Phantom, DJI S800 EVO, DJI Inspire 1 and other aircraft for recreational purposes as well as the use of Flight Training software during the past 25 years without incident.

Petitioner will abide by all FAA requirements to ensure this exemption will provide a level of safety at least equal to existing rules and will only operate in a safe environment that is strictly controlled. My exemption request would permit operation of ultra-light weight, unmanned (piloted by remote control) in predetermined areas away from general public, airports, heliports and vehicular traffic, under 400 feet AGL, during daylight hours and after carefully reviewing, inspecting and examining the area of aerial observation. Petitioner will conduct extensive preflight inspections and protocols, during which safety carries primary importance. This would allow for videos and photos within property boundaries for individual homeowner real estate listings.

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[1]Appendix A – UAS Details and Capabilities
[2]Appendix B – Sample Battery Log Form
[3]Appendix C – Sample Flight Log Form
[4]Appendix D – Sample Flight Plan
[5]Appendix E – Sample Maintenance Log Form
[6]Appendix F – ZuQuad Pre Flight Checklist
[7]Appendix G – ZuHex Pre Flight Checklist
[8]Appendix H – Sample Flight Notification/Release Form
[9]Appendix I – Flight Safety

14 C.P.R. Part 21, Subpart H: Airworthiness Certificates

14 C.P.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 UAS's, an exemption from Part 21 Subpart H meets the requirements of an equivalent level of safety under Part 11 and §333 of the Reform Act. The Federal Aviation Act (49 U.S.C.§44701 (f)) and §333 of the Reform Act both authorize the FAA to exempt aircraft from the requirement for an airworthiness certificate, upon consideration of the size, weight, speed, operational capability, and proximity to airports and populated areas of the particular UAS. In all cases, an analysis of these criteria demonstrates that the UAS operated without an airworthiness certificate, in the restricted environment and under the conditions proposed will be at least as safe, or safer, than a conventional aircraft (fixed wing or rotorcraft) operating with an airworthiness certificate without the restrictions and conditions proposed.

The UAS's to be operated by Petitioner are less than 11kg. with maximal payload consisting of remote

sensing instrumentation, carries neither no persons, carries no explosive or flammable materials including combustible fuels, and operates exclusively within a secured area. Unlike other civil aircraft, operations under this exemption will be tightly controlled and monitored by both the pilot (PIC), the Spotter role is designated to act as both the remote sensing controller and secondary monitor for safety issues. These enhancements to current safety practices and regulations, which already apply to civil aircraft, provide a greater degree of safety to the public and property owners than conventional aircraft operations conducted with airworthiness certificates issued under 14 C.P.R. Part 21, Subpart H. Lastly, application of these same criteria demonstrates that there is no intrinsic 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.

14 C.P.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 UAS will have no airworthiness certificate, an exemption may be needed as the UAS will have no entrance to the cabin, cockpit or pilot station on which the word "Experimental" can be placed. Given the size of the UAS, two- inch lettering will be impossible. Petitioner understands the need for markings and will mark our UAS's in the largest possible lettering by placing the word "Experimental" or assigned number or name (based on a request or ruling by the FAA) on its fuselage as required by §45.29(f) so that anyone assisting the spotter will see the markings. Further markings include the use of flashing green & red LED illumination on the underside of the UAS frame which adds contrast against a blue or white sky.

14 C.P.R. §61.113 (a) & (b): Private Pilot Privileges and Limitations: Pilot in Command (PIC)
§61.113 (a) & (b) limit private pilots to non-commercial operations. Because the UAS will not carry a pilot or passengers, the proposed operations can achieve the equivalent level of safety of current operations by requiring a ground crew member to have a private pilot's license rather than a commercial pilot's license to operate this UAS. Unlike a conventional aircraft that carries the pilot and passengers, the UAS is remotely controlled with no persons on board. The area of operation is controlled and restricted, and all flights are planned and coordinated in advance. The risks associated with the operation of the UAS are so diminished from the level of risk associated with commercial operations contemplated by Part 61 when drafted, that allowing operations as requested with a private pilot in the ground crew exceeds the present level of safety achieved by 14 C.P.R. §61.113 (a) & (b). Petitioner has 25 years' experience flying numerous practice flights in remote areas as a hobbyist simulating flights to gain familiarization with the characteristics of these UAS's performance under different temperature and weather conditions. Petitioner also owns and practice on a computerized simulated flight software to maintain adequate skills and response reflex time.

14 C.P.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 in the Manual for maintenance and use of safety check lists prior to each flight, a subset of which are provided in enclosed Supplemental material, an equivalent level of safety will be provided.

[5]Appendix E – Sample Maintenance Log Form

[9]Appendix I – Flight Safety

14 C.P.R. §91.9 (b) (2): Civil Aircraft Flight Manual in the Aircraft.
§91.9 (b) (2) provides: No person may operate a U.S.-registered civil aircraft ... (2) For which an Airplane or Rotorcraft Flight Manual is not required by §21.5 of this chapter, unless there is available in the aircraft a current approved airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof. The UAS, given its size and configuration has no ability to carry a physical flight manual on the aircraft. The equivalent level of safety will be maintained by keeping the flight manual at the ground control point where the pilot flying the UAS will have immediate access to it. The FAA has issued the following exemptions to this regulation: Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 9565B, 10167, 10167A, 10602, 32827, and 10700.

14 C.P.R. §91.1 03: Preflight Action
This regulation requires each Pilot in Command **(**PIC) to take certain actions before flight to insure the safety of flight. As FAA approved rotorcraft flight manuals will not be provided for the aircraft an exemption will be needed. The PIC will take all actions including reviewing weather, flight battery requirements, landing and takeoff distances and aircraft performance data before initiation of flight. Further, we have proprietary manuals created with the help of the manufacturer, the regional UAS vendor and continue to work with these organizations to ensure best safe practices are adhered to.

If granted an exemption the Petitioner agrees to additional safety procedures including, but not limited to:

- Keeping our UAS's within a radius distance of 1000 feet from the controller to both aid in direct line of sight visual observation.
- Operate the UAS's for 6-10 minutes per flight; land our UAS's according to the manufacturer's recommended minimum level of battery power.
- Operate our UAS's only within visual line of sight (VLOS) with the assistance of a spotter.
- Use the UAS's global positioning system(GPS) flight safety feature; it hovers and then slowly lands if communication with the remote control.
- Conduct all operations under our flight safety protocols.
- We will log each flight and battery use to and actively analyze flight data and other sources of information to constantly update and enhance my safety protocols.
- Contact respective airports if operations will be within 5 miles to advise them of the estimated flight time, flight duration, elevation of flight and other pertinent information.
- Always obtain all necessary permissions prior to operation.
- Have procedures in place to abort flights in the event of safety breaches or potential danger.

DJI has implemented Firmware updates that limit flight around airports, along with distance and elevation limits.

[1]Appendix A – UAS Details and Capabilities

[2]Appendix B – Sample Battery Log Form

[3]Appendix C – Sample Flight Log Form

[4]Appendix D – Sample Flight Plan
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14 C.P.R. §91.109: Flight Instruction
§91.103 provides that no person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls. UAS's and remotely piloted aircraft, by their design do not have fully functional dual controls. Flight control is accomplished through the use of a control box that communicates with the aircraft via radio communications. The FAA has approved exemptions for flight training without fully functional dual controls for a number of aircraft and for flight instruction in experimental aircraft. See Exemption Nos.5778K & 9862A. The equivalent level of safety provided by the fact that neither a pilot nor passengers will be carried in the aircraft and by the size and speed of the aircraft. Enhancing this safety is the technology inherent in the remote controls utilizing digital communications which is paired to the UAS making it nearly impossible to unintentionally or intentionally have the control communications interrupted.

14 C.P.R. §91.119: Minimum Safe Altitudes
§91.119 establishes safe altitudes for operation of civil aircraft. §91.119 (d) allows helicopters to be operated at less than the minimums prescribed, provided the person operating the helicopter complies with any route or altitudes prescribed for helicopters by the FAA. As this exemption is for a UAS that closely mimics the behavior of a helicopter, and the exemption requests authority to operate at altitudes up to 400 feet AGL, an exemption may be needed to allow such operations. As set forth herein, the UAS will never operate at higher than 400 feet AGL or beyond unaided visual line of sight, whichever is closer. It will however be operated in a restricted area with individuals tasked with ensuring public safety, and where buildings and people will not be exposed to operations without their pre-obtained consent and training.

The equivalent level of safety will be achieved given the size, weight, speed of the UAS as well as the location where it is operated. No flight operation will be taken without the permission of the property owner. Because of the advance notice to the property owner and participants in the remote sensing activity, all affected individuals will be aware of the planned flight operations. Compared to flight operations with aircraft or rotor craft weighting far more than the maximum 11 kg of Petitioner's UAS's proposed herein and the lack of flammable fuel, any risk associated with these operations is far less than those presently presented with conventional aircraft operating at or below 500 AGL. In addition, the low-altitude operations of the UAS will ensure separation between these small- UAS operations and the operations of conventional aircraft that must comply with §91.119.

DJI has implemented Firmware updates that limit flight around airports, along with distance and elevation limits.

[4]Appendix D – Sample Flight Plan
[8]Appendix H – Sample Flight Notification/Release Form
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14 C.P.R. §91.121 Altimeter Settings
§91.121 requires each person operating an aircraft to maintain cruising altitude by reference to an altimeter that is set " ... to the elevation of the departure airport or an appropriate altimeter setting available before departure:' As the UAS may not have a barometric altimeter, but instead a GPS altitude read out, an exemption may be needed. An equivalent level of safety will be achieved by the operator, confirming the altitude of the launch site shown on the GPS altitude indicator before flight. The in Command **(**PIC) will also ensure effective pairing with multiple GPS sources to guarantee accurate detection of height.

14 C.P.R. §91.151(a): Fuel Requirements for Flight in VFR Conditions
§91.151 (a) prohibits an individual from beginning "a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing, and, assuming normal cruising speed (1) During the day, to fly after that for at least 30 minutes; or (2) At night, to fly after that for at least 45 minutes." The battery powering the UAS's provide approximately 12-15 minutes of powered flight in hover mode without payload. Petitioner's UAS's will not be able to meet the 30 minute reserve requirement in 14 CPR §91.151. Operating the small UAS's, in a tightly controlled area where only people and property owners or official representatives who have signed waivers will be allowed, with less than 30 minutes of reserve power, does not engender the type of risks that Section 91.151(a) was intended to alleviate given the size and speed of the small UAS's. Petitioner believes that an equivalent level of safety can be achieved by limiting flights to 6-10 minutes or 25% of battery power whichever happens first. This restriction would be more than adequate to return the UAS to its planned landing zone from anywhere in its limited operating area. Similar exemptions have been granted to other operations, including Exemptions 2689F, 5745, 10673, and 10808.

[6]Appendix F – ZuQuad Pre Flight Checklist
[7]Appendix G – ZuHex Pre Flight Checklist
[9]Appendix I – Flight Safety

14 C.F.R. §91.203 (a) & (b): Carrying Civil Aircraft Certification and Registration
The regulation provides in pertinent part:
(a) Except as provided in §91.715, no person may operate a civil aircraft unless it has within it the following:
(1) An appropriate and current airworthiness certificate ...
(b) No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under §91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew. The UAS's fully loaded weigh no more than 11kg and is operated without an onboard pilot. As such, there is no ability or place to carry certification and registration documents or to display them on the UAS's. An equivalent level of safety will be achieved by keeping these documents at the ground control point where the pilot flying the UAS will have immediate access to them, to the extent they are applicable to the UAS's. The FAA has issued numerous exemptions to this regulation. A representative sample of other exceptions includes Exemption Nos. 9565, 9665, 9789, 9789A, 9797, 9797 A, 9816A, and 10700.

14 C.F.R. §91.405 (a); 407 (a) (1); 409 (a) (2); 417(a) & (b): Maintenance Inspections
These regulations require that an aircraft operator or owner "shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter ... ;' and others shall inspect or maintain the aircraft in compliance with Part 43. Given that these section and Part 43 apply only to aircraft with an airworthiness

certificate, these sections will not apply to the applicant. Maintenance will be accomplished by the operator pursuant to the flight manual. An equivalent level of safety will be achieved because these small UAS's are very limited in size and will carry a small payload and operate only in restricted areas for limited periods of time. If mechanical issues arise the UAS can land immediately and will be operating from no higher than 400 feet AGL. The Petitioner will ensure that the UAS is in working order prior to initiating flight, perform required maintenance, and keep a log of any maintenance performed. Moreover, the Petitioner is most familiar with the aircraft and best suited to maintain the aircraft in an airworthy condition to provide the equivalent level of safety.

[2]Appendix B – Sample Battery Log Form
[5]Appendix E – Sample Maintenance Log Form

Summary

The Petitioner believes that exemption from the above listed Title 14 CFRs is warranted given the nature of the type of UAS flights that will be undertaken, the size & weight of the UAS being deployed, the safety precautions to the general public and the NAS the Petitioner intends to adhere to, the positive environmental impact the flight operations would have compared to manned fuel consuming missions and the economic benefit the Petitioner's business would have in this new area of aviation.

Thank you for your review of this matter.

Dale Lauterback

ZuWerks, Inc.
President