



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

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

June 23, 2015

Exemption No. 11881  
Regulatory Docket No. FAA-2015-1228

Mr. Bradley Ward  
Chief Pilot  
Empire Unmanned LLC  
11559 North Atlas Road  
Hayden, ID 83835

Dear Mr. Ward:

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 17, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Empire Unmanned LLC (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial surveying, aerial photography, agriculture, wildlife and forestry monitoring, wild land firefighting support, patrolling, aerial inspection, real estate surveying, crew member training, and mapping operations.

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

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

#### **Airworthiness Certification**

The UAS proposed by the petitioner are the DJI Phantom 2 Vision+, DJI Phantom 2, DJI Inspire 1, DJI S1000+, and DJI S900.

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<sup>1</sup>. 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, Empire Unmanned LLC is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to

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<sup>1</sup> 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, Empire Unmanned LLC is hereafter referred to as the operator.

Failure to comply with any of the conditions and limitations of this grant of exemption will be grounds for the immediate suspension or rescission of this exemption.

1. Operations authorized by this grant of exemption are limited to the DJI Phantom 2 Vision+, the DJI Phantom 2, the DJI Inspire 1, the DJI S1000+, and the DJI S900 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.nts.gov](http://www.nts.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 June 30, 2017, unless sooner superseded or rescinded.

Sincerely,

/s/

John S. Duncan  
Director, Flight Standards Service

Enclosures





17 April 2015

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

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

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the "Reform Act") and 14 C.F.R. Part 11, Empire Unmanned LLC, seeks an exemption from Federal Aviation Regulations ("FARs") detailed below for the DJI Phantom 2 Vision+, DJI Phantom 2, DJI Inspire 1, DJI S1000+, and DJI S900.

The requested exemption would support an application for a commercial Certificate of Authorization (COA) to use the system to support aerial surveying, aerial photography, agriculture, wildlife and forestry monitoring, wild land firefighting support, patrolling, aerial inspection, real estate surveying, crew member training, and mapping operations. By approving these exemptions, the FAA will support various industries, benefit the environment and build a new profession, all of which are in the public interest.<sup>1</sup>

Each DJI UAS weighs less than 55 lbs. fully loaded, will be operated at a speed no more than 87 knots, carry neither a pilot nor passenger, carry no explosive materials or flammable liquids, and operate exclusively within an approved COA airspace. All DJI UA Systems use a radio frequency spectrum for operation and control that complies with Federal Communications Commission ("FCC") requirements and has integrated safety features as described within user manuals for each DJI UAS. The UAS are equipped with redundant safety mechanisms allowing them to operate safely after experiencing certain in-flight failures. If a lost-link event occurs, including the loss of ground communications and/or the loss of a GPS signal, the UAS have the ability to perform a pre-coordinated, predictable, automated flight maneuver and return to a predetermined location within a designated security parameter for landing. The UAS further have the ability to abort a flight in the event of unpredicted obstacles or emergencies. The aircraft will be operated in the field with both a Pilot in Command (PIC) and a ground-based Visual Observer (VO) in accordance with FAA Order 8900.1, vol. 16 "Unmanned Aircraft Systems" with the following additional restrictions:

- All operations will be conducted IAW the Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA).
- All UAS operations will remain clear of manned aviation operations and activities at all times.
- All operations will occur at altitudes no more than 400' AGL
- Operations will be operated over private property with the permission of the land owner
- The UAS will not be operated by a PIC from any moving device.

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<sup>1</sup> We will provide an explanation of equivalent level of safety for each exemption request, but will point back to the benefits to agriculture and the environment to justify why the requests are in the public interest.



- The aircraft will not be operated within 5 NM of an airport or heliport unless prior coordination with ATC or airport management is made.
- Operations will be limited to day, visual meteorological conditions
- Aircraft will remain within Visual Line of Sight of the PIC and VO at all times.
- While the aircraft is airborne, the VO will be positioned within voice distance to the PIC

The PIC and VO will meet the requirements outlined in FAA Order 8900.1, volume 16, chapter 4. The PIC will hold at least a recreational or sport pilot certificate. Additionally, the PIC will perform maintenance on the system and will complete a course of maintenance instruction as part of their initial training. Due to the simplicity of the system, we do not anticipate the need for a supplemental pilot.

We submit that the combination of the aircraft's light weight, historically demonstrated flight performance, fully qualified flight crew and strict operation under the guidelines established in 8900.1, the FAA can have confidence that the operation will have an equivalent or greater level of safety of manned aircraft performing the same mission.

The name and contact information of the applicant are:

Empire Unmanned LLC  
Attn: Bradley Ward  
Ph: 208-292-3850  
Email: bradw@adavso.com

The regulations from which the exemption is requested are as follows:

- 14 CFR Part 21
- 14 CFR 91.203
- 14 CFR 45.23, 45.29
- 14 CFR 91.9
- 14 CFR 61.113, 61.133
- 14 CFR 91.109, 91.119
- 14 CFR 91.121, 91.151
- 14 CFR Subpart E (91.401 - 91.417)
- 14 CFR 91.103(b)

We are prepared to modify or amend any part of this request to satisfy the need for an equivalent level of safety. We look forward to working with your office. Please contact us at any time if you require additional information or clarification.

Sincerely,

A handwritten signature in blue ink that reads "Bradley J. Ward".

Bradley J. Ward  
Chief Pilot, Empire Unmanned



Appendices:

- A. Exemption Request and Equivalent Level of Safety
- B. Privacy Issues
- C. Safety Assessment
- D. Maintenance Procedures
- E. User Manuals
- F. Training Program
- G. Aviation Experience

## Appendix A

### EXEMPTION REQUESTS AND EQUIVALENT LEVEL OF SAFETY

Empire Unmanned LLC requests an exemption from the following regulations as well as any additional regulations that may technically apply to the operation of DJI UAS:

#### **14 CFR Part 21, Subpart H: Airworthiness Certificates**

This part establishes the procedures for the issuance of an airworthiness certificate. While the FAA continues to work to develop airworthiness standards for UAS, we request an experimental certificate be issued for DJI UAS under either or both of the following provisions:

21.191 Experimental certificates.

Experimental certificates are issued for the following purposes:

**(a) *Research and development.*** Testing new aircraft design concepts, new aircraft equipment, new aircraft installations, new aircraft operating techniques, or new uses for aircraft.

**(b) *Showing compliance with regulations.*** Conducting flight tests and other operations to show compliance with the airworthiness regulations including flights to show compliance for issuance of type and supplemental type certificates, flights to substantiate major design changes, and flights to show compliance with the function and reliability requirements of the regulations.

Since the experimental certificate can be used for commercial purposes such as market surveys, sales demonstrations, and customer crew training, we would expect that an experimental certificate would permit our commercial purpose as well.

The aircraft will not carry persons or property, will not carry fuel, and will only fly under strict operational requirements. Combined with the fact that the aircraft weighs less than 55 lbs., we propose that DJI UAS will be at least as safe, if not safer, than a conventionally certificated aircraft performing the same mission.

If an experimental airworthiness certificate is not appropriate for this application, then we request an exemption of 14 CFR Part 21, Subpart H, and the requirement for an airworthiness certificate in general, citing the equivalent level of safety outlined in the previous paragraph.

#### **14 CFR 91.203(a) & (b) Civil aircraft: Certifications required.**

The regulation provides that an airworthiness certificate, with the registration number assigned to the aircraft and a registration certificate must be aboard the aircraft. Additionally, subparagraph (b) provides that the airworthiness certificate be "displayed at the cabin or cockpit entrance so that it is legible to passengers or crew." Each DJI UAS is too small to carry documentation, does not have an entrance, and is not capable of carrying passengers or crew.



To obtain an equivalent level of safety and meet the intent of 91.203, we propose that documents deemed appropriate for this aircraft by the FAA will be co-located with the crew at the ground control station and available for inspection upon request. In order to identify the aircraft, we propose that the information found on airworthiness and registration certificates be permanently affixed to the aircraft via placard:

Manufacturer: DJI  
Models: Phantom 2 Vision+, Phantom 2, Inspire 1, S1000+, and S900

Registered to:  
Empire Unmanned LLC  
11559 N. Atlas Road  
Hayden, ID 83835

If found please contact: (208)-292-3881.

#### **14 CFR 45.23 Display of marks; general and 45.29 Size of marks.**

These regulations provide that each aircraft must display "N" and the aircraft's registration number in letters at least 3 inches high. Additionally, the aircraft must display the word "EXPERIMENTAL" in letters at least 2 inches high near the entrance to the cabin, cockpit, or pilot station. Each DJI UAS does not have an entrance in which the word "EXPERIMENTAL" can be placed, and may not have a registration number assigned to it by the FAA.

We propose to achieve an equivalent level of safety by including the word "EXPERIMENTAL" on the top of the aircraft, where the PIC, VO and others in the vicinity of the aircraft while it is preparing for launch will be able to see the designation. Additionally, we feel that the permanent placard discussed in the previous paragraph will provide the aircraft's registration information should it be found on the ground. Finally, we will display at the ground station a high contrast flag or banner that contains the words "Unmanned Aircraft Ground Station" in letters 3 inches high or greater. Since the aircraft will operate within VLOS of the PIC and VO near the ground station, the banner should be visible to anyone that observes the aircraft and chooses to investigate its point of origin.

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

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

To obtain an equivalent level of safety and meet the intent of 91.9, we propose that a current, approved Airplane Flight Manual (appendix E) must be available to the crew at the ground station anytime the aircraft is in, or preparing for, flight.

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

The regulation provides that no person that holds a private pilot certificate may act as pilot in command of an aircraft for compensation or hire. Subparagraph (b) allows a private pilot to act as pilot in command of an aircraft in connection with any business or employment if: (1) The flight is only incidental to that business or employment; and (2) The aircraft does not carry passengers or property for compensation or hire.

Our proposed operations meet the requirements of 8900.227 para 16(c)(2)(c) "Operations without a pilot certificate" in which the PIC is required to complete "FAA private pilot ground instruction" and pass "the FAA Private Pilot written examination." Since there are currently no means available for the pilot of a UAS to gain the experience in an equivalent category and class in order to apply for a commercial pilot's license, we propose to generate an equivalent level of safety by requiring our pilots to complete, at a minimum, FAA commercial pilot ground instruction and pass the FAA Commercial Pilot written examination in addition to completing at least a recreational or sport pilot certificate requirements. Since the aircraft cannot carry passengers or property, we feel we meet the intent of 61.113 Subparagraph (b) even though the intent of this application is to conduct a business.

#### **14 CFR 91.109 Flight instruction; Simulated instrument flight and certain flight tests**

The regulation provides that "No person may operate a civil aircraft that is being used for flight instruction unless that aircraft has fully functioning dual controls." The DJI UAS ground control station is based on a small hand-held radio controller and, if applicable, a mobile device. While it does not offer a second set of "controls", both the student and instructor can, and will, operate the single set of controls simultaneously. With both student and instructor having "hands-on" the controls during flight, we feel that this technique meets the intent 91.109 and provides an equivalent level of safety.

#### **14 CFR 91.119 Minimum safe altitudes: General.**

The regulation provides that over sparsely populated areas the aircraft cannot be operated closer than 500 feet to any person, vessel, vehicle, or structure. Since the aircraft will be operating at a maximum of 400 feet AGL, we cannot comply with this requirement.

To provide an equivalent level of safety we will only fly over private property with the permission of the land owner. The land owner will be briefed of the expected route of flight and the associated risks to persons and property on the ground. We maintain that due to the small size of each DJI UAS, the hazard to persons, vessels, vehicles, and structures is not comparable to manned aircraft and should be considered in granting the exemption.

The aircraft will be operated at an altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.

#### **14 CFR 91.121 Altimeter settings.**

The regulation provides that aircraft shall maintain cruising altitudes by reference to an altimeter setting available within 100 nautical miles of the aircraft. The aircraft will fly below 400 feet AGL and will not need to maintain hemispherical cruising altitudes in order to de-conflict with other aircraft. As such, an appropriate altimeter measurement presented to the pilot should be Above Ground Level and should be based on the digitally encoded telemetric data feed, which downlinks from the aircraft to a ground-based on-screen display. The altitude information will be generated by equipment installed onboard the UAS, using GPS triangulation, digitally encoded barometric altimeter, radio altimeter, or any combination thereof. Prior to each flight, a zero altitude initiation point will be established and confirmed for accuracy by the UAS PIC. Since the aircraft will fly no more than 30 minutes, even rapid changes in barometric pressure will have limited effect on the safety of the flight.

#### **14 CFR 91.151 Fuel requirements for flight in VFR conditions.**

The regulation provides that no person may begin a flight in an airplane under day-VFR conditions unless there is enough fuel to fly to the first point of intended landing and to fly after that for at least 30 minutes. We feel the intention of this paragraph is to provide a reserve of energy as a safety buffer for go-arounds and other delays to landing.

Each DJI UAS is battery operated and the maximum duration of flight from a single battery charge is 30 minutes. Since the aircraft will never fly more than VLOS from the PIC and the VO near the point of intended landing, a full battery charge at launch will ensure that we meet the reserve energy requirement of this paragraph. The UAS will not be operated unless it can begin the flight with enough power to complete the intended operation and operate after that for at least five minutes or with the reserve power recommended by the manufacturer. We request an exemption to the word "fuel" and ask for an equivalent interpretation with the word "energy".

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

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

The UAS will be maintained IAW the manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for both the system and related components. Maintenance performed by the PIC is limited to repairing small cracks, replacing a propeller, and updating software and firmware. All other maintenance will be performed by the manufacturer. The PIC

will document work performed in accordance with 91.417. We feel that due to the size, construction, and simplicity of the aircraft, the PIC can ensure an equivalent level of safety.

Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristic will undergo a functional test flight prior to conducting further operations. Functional test flights will only be conducted by a current and qualified PIC with a VO and will remain 500 feet from other people.

#### **14 CFR 91.103(b) – Preflight Action**

The regulation prescribes, in pertinent part, that each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight, to include, “For any flight, runway lengths at airports of intended use, and the following takeoff and landing distance information:... For civil aircraft for which an approved Airplane or Rotorcraft Flight Manual containing takeoff and landing distance data is required, the takeoff and landing distance data contained therein.”

The PIC will take all actions including reviewing weather, flight battery requirements, aircraft performance data, and landing and takeoff distances before initiation of a flight. The PIC will also account for all relevant site-specific conditions in their preflight procedures. Risks presented by sun glare will be mitigated by the PIC’s and VO’s ability to see other air traffic and initiate a return-to-home sequence if needed. However, given the limited nature on how the UAS will be used and that all operations will not be conducted within an airport environment, takeoff and landing data associated with airport data will not be applicable. Therefore, we request relief from 91.103(b).