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

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

May 22, 2015

Exemption No. 11671
Regulatory Docket No. FAA–2015–0648

Mr. Matthew J. Clark
McKenna Long & Aldridge LLP
1676 International Drive, Penthouse
McLean, VA 22102

Dear Mr. Clark:

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 March 12, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Dronair Solutions (hereinafter petitioner or operator) for an exemption. The exemption would allow the petitioner to operate an unmanned aircraft system (UAS) to conduct closed-set filming for the motion picture, television, and web industries and aerial inspection and environmental monitoring of industrial sites, transmission and storage facilities, construction facilities, and aerial surveys.

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 a DJI S1000+ and Aeryon SkyRanger.

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 and closed set motion picture and filming. 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, Dronair Solutions 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 or closed set motion picture and filming. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, Dronair Solutions 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 S1000+ and Aeryon SkyRanger 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 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 5 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,

John S. Duncan
Director, Flight Standards Service

Enclosures

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March 12, 2015

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

Re: Petition of Dronair Solutions for an Exemption Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012

To Whom it May Concern:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 ("Reform Act") and 14 C.F.R. Part 11, Dronair Solutions ("Dronair") hereby applies for an exemption from the Federal Aviation Regulations ("FARs") identified below to allow commercial operation of small unmanned aerial vehicles (*i.e.*, "small unmanned aircraft" or "UAS") for the purpose of conducting: (1) scripted, closed-set filming for the motion picture, television, and web industry, and; (2) aerial inspection and environmental monitoring of industrial sites, transmission and storage facilities, construction facilities and precision aerial surveys.

This petition for exemption is made based on information outlined in this Petition for Exemption, as well as the accompanying Dronair sUAS Flight Operations Manual, Dronair DJI S1000+ sUAS Aircraft Flight Manual and Dronair Aeryon SkyRanger sUAS Aircraft Flight Manual (collectively referred to as "Dronair's Operations Manuals"), the Aeryon SkyRanger User Guide and DJI S1000+ User Manual (collectively referred to as "Manufacturer's Manual").[1] Dronair submits these supporting materials as confidential documents pursuant to 14 C.F.R. § 11.35(b), as the materials contain confidential commercial and/or proprietary information that Dronair has not and will not share with others. Additionally, these documents contain operating conditions and procedures that are not generally available to the public and are protected from release under the Freedom of Information Act, 5 U.S.C. § 552 *et seq.*

[1] The term "Manufacturer's Manual" also includes all relevant manufacturer publications, including, but not limited to: operations and flight manuals, user guides, component maintenance manuals, pilot training manuals, service information letters and, safety/service bulletins.

For your convenience, this Petition is organized as follows:

I. DESCRIPTION OF PETITIONER

Based in Houston, Texas, Dronair is an aerial cinematography company dedicated to providing technologically driven and innovative solutions in the filmmaking industry. Its founders, Aaron Moss and Jeff Johnson are both commercially rated rotorcraft and fixed-wing pilots with a combined flight time of over 7,300 flight hours and 15 years of commercial and military aviation experience. As part of Dronair's vision of providing new and innovative solutions to its client's needs, and building upon its founders extensive commercial and military flight experience, Dronair seeks an exemption to allow commercial operations of small UAS to provide aerial photography and video services to the to the filming industry, as well as aerial surveys, inspections, and environmental monitoring of industrial and construction sites, and utility power-generation facilities and infrastructure.

The contact information for Petitioner is as follows:

Aaron Moss
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Dronair Solutions
2011 Willowmoss CT
Phone: (281) 773-6205
Email: aarommoss@gmail.com

II. DESCRIPTION OF PROPOSED OPERATION

Dronair seeks an exemption pursuant to Section 333 of the Reform Act to operate the DJI S1000+ UAS and Aeryon Labs SkyRanger ("SkyRanger") UAS for the proposed operations discussed below. All UAS operations will occur under tightly controlled conditions on private property where Dronair has received permission to operate from the landowner, controller or authorized representative. The proposed UAS operations will be conducted in accordance with the conditions and limitations of this Petition for Exemption and Dronair's Operations Manuals. As detailed in Dronair's Operations Manuals, all UAS operations will be limited to daytime VFR conditions, within visual line-of-sight ("VLOS") of the operator, in uncontrolled airspace, and will occur at least 5 miles away from an airport. Moreover, Dronair's Operations Manuals incorporate redundant safeguards to assure that the aircraft does not travel outside the controlled area of UAS operations, including GPS "geo-fencing" technologies.

A. Closed-set Filmmaking and Cinematography

Dronair seeks to use small UASs for the purpose of conducting scripted, closed-set filming for the motion picture, television, and web industry. Dronair has tailored its operations to meet the requirements established by the FAA in prior grants of exemption authorizing commercial use of UAS in the motion picture and television filmmaking industry, including:

- Astraeus Aerial (Exemption No. 11062)
- Aerial MOB, LLC (Exemption No. 11066)
- Pictorvision, Inc. (Exemption No. 11067)
- HeliVideo Productions, LLC (Exemption No. 11065)
- Snaproll Media, LLC (Exemption No. 11063)
- RC Pro Productions Consulting, LLC d/b/a Vortex Aerial (Exemption No. 11064)
- Flying-Cam, LLC (Exemption No. 11080)
- Aerocine, LLC (Exemption No. 11150)
- Team 5, LLC (Exemption No. 11158)
- Alan D. Purwin (Exemption No. 11161)
- Helinet Aviation Services, LLC (Exemption No. 11160)
- Picture Factory, Inc. (Exemption No. 11178)

All UAS filmmaking operations will occur on private property in a controlled area, away from spectators and persons not involved in the filming. In addition, the filming will be conducted during daylight, VFR conditions, at altitudes below 400' AGL. As set forth below, Dronair's operations provide an equivalent level of safety that is superior to performing the same work using conventional fixed-wing aircraft or helicopters.

B. Aerial Survey and Inspection of Industrial/Construction Sites and Utility Power-Generation Facilities and Infrastructure

Dronair seeks to use small UASs for the purpose of conducting aerial imaging for safety monitoring of controlled access industrial and construction sites, utility power-generation transmission and distribution facilities and infrastructure. Traditional methods of inspecting this type of infrastructure, including flare stacks, elevated pipelines and power lines, tanks, and steep rooftops, expose inspecting engineers to risk of harm or serious injury. Inspectors need to climb tower or otherwise perform elevated work, which exposes them to the risk of dangerous falls. In addition, depending on the nature of the inspection, proximity to equipment often involves a risk of exposure to hazardous chemicals or oxygen-deficient atmospheres, burns from steam or hot equipment, and other mechanical hazards associated with industrial sites and construction facilities. The use of small UASs mitigates these hazards and is ultimately a much safer method of performing these types of inspections.

Small UAS inspection is also safer than traditional manned aircraft performing the same function. Conventional operations using rotorcraft and fixed-wing aircraft in low level operations present risks associated with vehicles weighing thousands of pounds and carrying large amounts of fuel. It is important to note that the use of small UAS in this area will not only be safer and more cost effective, but the quality of the information will be far superior. Small UAS inspection is more reliable, and allows for the collection, dissemination, and storage of visual and other sensory data with greater precision and duration. Small UASs will also be

capable of accessing and inspecting areas that would otherwise be inaccessible using conventional aircraft or other inspection methods.

III. RELEVANT STATUTORY AUTHORITY

This Petition for Exemption is submitted pursuant to Section 333(a) through (c) of the FAA Modernization and Reform Act of 2012 ("Reform Act"). Congress has directed the FAA "to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system." Pursuant to Section 333 of the Reform Act, the FAA Administrator is to permit unmanned aircraft systems to operate in the National Air Space ("NAS") where it is safe to do so based on the following considerations:

- The UAS's size, weight, speed and operational capability;
- Operation of the UAS in close proximity to airports and populated areas; and
- Operation of the UAS within the visual line of sight of the operator.

Additionally, the FAA Administrator has general authority to grant exemptions from the agency's safety regulations and minimum standards when the Administrator decides a requested exemption is in the public interest. *See* 49 U.S.C. § 106(f) (defining the authority of the Administrator); 49 U.S.C. § 44701(f) (permitting exemptions from §§ 44701(a), (b) and §§ 44702 – 44716, *et seq.*). A party requesting an exemption must explain the reasons why the exemption: (1) would benefit the public as a whole, and (2) would not adversely affect safety (or how it would provide a level of safety at least equal to the existing rules). *See* 14 C.F.R. § 11.81 (petitions for exemption).

IV. DRONAIR'S PROPOSED UAS OPERATIONS MEET THE REQUIREMENTS OF SECTION 333 OF THE REFORM ACT

The small UAS operations proposed by Dronair in this Petition for Exemption qualify for expedited approval pursuant to Section 333 of the Reform Act as each of the statutory criteria and relevant factors are satisfied.

A. Approval is Warranted Based on the UAS's Size, Weight, Speed, and Operational Capability

A Grant of Exemption is appropriate for operations conducted using the SkyRanger and DJI S1000+ UASs due to their size weight, speed, and operational capability.

- Both the SkyRanger and DJI S1000+ have been approved for use in prior Section 333 Grants of Exemption from the FAA.[2]

- The SkyRanger weighs less than 10 pounds, including payload.

- The DJI S1000+ weighs less than 25 pounds, including payload.

- The Aeryon SkyRanger and DJI S1000+ will not be flown at a ground speed in excess of 50 knots.

- Altitude information will be generated by equipment onboard the UA as specified using GPS triangulation, digitally encoded barometric altimeter, radio altimeter, or any combination thereof. This information will be transmitted to the pilot via telemetric data feed.

- The UASs will have system redundancies and independent functionality to ensure the overall safety and predictability of the system. If connection to the remote control or ground control station is lost, failsafe systems will permit the UAS to return to a predetermined location and safely land without injury or damage.

- The radio frequencies used for operations and control of the UAS comply with the Federal Communications Commission ("FCC") and other appropriate government oversight agency requirements. The operating frequency for the DJI S1000+ is 2.4 GHz. The SkyRanger is capable of operating on 900 MHz, 2.4 GHz or 5.8 GHz frequency bands.

If the same operations were conducted using a helicopter, the aircraft's take-off weight would likely exceed 6,000 pounds. The difference in weight between the SkyRanger and DJI S1000+ and a helicopter significantly reduces the potential harm to the participating and non-participating individuals or property in the event of an accident or incident. In addition, the risk to the onboard pilot and camera operator is eliminated.

[2] *See e.g.*, Grant of Exemption to Shotover Camera Systems L.P. (Exemption No. 11159); Grant of Exemption to VDOS Global, LLC (Exemption No. 11112); Grant of Exemption to LowCountryRC, Corp. (Exemption No. 11184); Grant of Exemption to Alan Purwin (Exemption No. 11161); Grant of Exemption to Helinet Aviation Services (Exemption No. 11160); Grant of Exemption to Total Safety U.S., Inc. (Exemption No. 11156).

B. Approval is Warranted Based on the Operational Restrictions Set Forth in Dronair's Operations Manuals

Dronair's Operations Manuals and the Manufacturer's Manual for the selected UASs will contain all the procedures and limitations necessary to safely and successfully perform the operations specified in this Petition for Exemption. To assist the FAA in making a safety assessment of Dronair's proposed operations, below is a summary of operational limitations and conditions that Dronair will adhere to, and which will ensure an equivalent or higher level of safety to operations conducted under current regulatory guidelines:

1. The UAS weighs less than 25 pounds, fully loaded.

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

3. All UASs operated under the Grant of Exemption will 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 will be as large as practicable.

4. Minimum crew for each flight operation will consist of a pilot, who will be Pilot-in Command ("PIC") of the UAS, and one or more Visual Observers ("Observer") as necessary to safely conduct the mission.

5. PICs shall possess at least a Private Pilot's Certificate and current Class III Medical Certificate. The PIC will also meet the flight review requirements specified in 14 C.F.R 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

6. The UA shall be operated within VLOS of the PIC and Observer at all times. The PIC must use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued medical certificate.

7. The PIC and Observer designated for any operation will be able to communicate verbally at all times.

8. Electronic messaging or texting will not be permitted during flight operations.

9. The additional requirements identified in the Grant of Exemption shall be added to the Dronair's Operations Manuals. The Operations Manuals will be maintained

and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in the Grant of Exemption and Dronair's Operations Manuals, the conditions and limitations in the Grant of Exemption shall take precedence and must be followed. Otherwise, Dronair shall follow the procedures outlined in their Operations Manuals.

10. Dronair may update or revise its Operations Manuals. Revisions will be tracked and a revised copy of the Manual will be provided to the Administrator upon request. Dronair will also present an updated and revised Operations Manuals if it petitions for extension or amendment to its Grant of Exemption. If an update or revision would affect the basis upon which the FAA grants the exemption, Dronair will seek an amendment to its Grant of Exemption. Dronair will contact the FAA's UAS Integration Office (AFS-80) if questions arise regarding updates or revisions to the operating documents.

11. Dronair Operations Manuals and its Grant of Exemption will be available to the PIC at the ground control station anytime the UAS is operating.

12. The PIC is prohibited from beginning a SkyRanger flight unless (considering wind and forecast weather conditions) there is enough power to fly to the first intended point of landing, and assuming normal cruising speed, to fly after that for at least 10 minutes.

13. Maximum total flight time for each operational flight using the DJI S1000+ will be limited to 40 minutes or the amount of time the UAS can be flown and still maintain a reserve battery power of no less than 25%, whichever occurs first.

14. Flights will be operated at an altitude of no more than 400 feet AGL and will never enter navigable controlled airspace without prior written authorization and approval from the FAA. In the event the structure being inspected exceeds 400 feet AGL, the UAS will not be operated more than 100 feet above the highest point on the structure, and no more than 50 feet horizontally from the structure.

15. Flight operations must be conducted at least 500 feet from all nonparticipating persons. (persons other than the PIC, VO, operator trainees or essential 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 and/or;

b. The aircraft is operated near vessels, vehicles or structures where the owner/controller of such vessels, vehicles or structures has granted permission 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, and;

c. Operations nearer to the PIC, VO, operator trainees or essential persons do not present an undue hazard to those persons per § 91.119(a).

16. 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.

17. The UA may not operate within 5 nm of an airport reference point as denoted on a current FAA-published aeronautical chart unless a letter of agreement with that airport's management is obtained, and the operation is conducted in accordance with a NOTAM as required by the Dronair COA. The letter of agreement with the airport management will be made available to the Administrator upon request.

18. Prior to each flight the PIC shall inspect the UAS to confirm that it is in a condition safe for flight. The pre-flight inspection will account for all discrepancies, *e.g.* inoperable components, items, or equipment, not already covered in the relevant sections of the operating documents. The PIC shall not operate the UAS if the inspection reveals a condition that affects the safe operation of the UAS until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight. The ground control station shall be included in the preflight inspection. All maintenance and alternations must be properly documented in the UAS records as required by Dronair's Operations Manuals.

19. Dronair will carry out its maintenance, inspections, and record keeping requirements in accordance with the Operations Manuals. Maintenance, inspection, and alterations will be noted in the UAS records, including total time in service, description of work accomplished, and the signature of the authorized person returning the UAS to service.

20. 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 in accordance with Dronair's Operations Manuals. The PIC who conducts the functional test flight must make an entry in the UAS aircraft records of the flight. The requirements and procedures for a functional

test flight and UAS record entry shall be included in the Dronair's Operations Manuals.

21. The UAS will be operated and maintained according to the Manufacturer's Manuals and any required manufacturer Safety/Service Bulletins.

22. Prior to the operation, a Mission Packet will be created in accordance with the requirements on Dronair's Operations Manuals.

23. Dronair will obtain an Air Traffic Organization ("ATO") issued Certificate of Waiver or Authorization, otherwise known as a COA, prior to conducting any operations under this Grant of Exemption. A NOTAM will be issued as required by the COA. All operations will be conducted in accordance with airspace requirements in the ATO issued COA including class of airspace, altitude level and potential transponder requirements.

24. All required permissions and permits will be obtained from territorial, state, county or city jurisdictions, including local law enforcement, fire or other appropriate governmental agencies.

25. If the UAS loses communication with the pilot, it will have the capability to return to a pre-determined location within the operational area and land safely.

26. Contingency plans will be in place to safely terminate flight if there is a loss of communication between the PIC and the Observer.

27. The UAS will have the capability to safely abort flight in the case of unpredicted obstacles or emergencies.

28. PICs and Observers will have at least a current Class III Medical Certificate.

29. Prior to conducting operations for filming, the PIC will have accumulated and logged, in a manner consistent with 14 CFR § 61.51(b), a minimum of 200 flight cycles and 25 hours total time as a UAS rotorcraft pilot and at least 10 hours logged as a UAS pilot with a similar UAS type.

30. Prior to conducting operations for filming, the PIC will have accumulated and logged, in a manner consistent with 14 CFR § 61.51(b), a minimum of 54 CFR § 61.51(b), a minimum of hours as UAS pilot operating the make and model of UAS to be utilized for operations under the exemption and three take-offs and three landing in the preceding 90 days.

31. Operations shall occur during daytime VFR Meteorological Conditions; flights under special visual flight rules ("SVFR") shall not be conducted.

32. The UA shall remain clear and yield the right of way to all other manned operations and activities at all times (including, but not limited to, ultralight vehicles, parachute activities, parasailing activities, hang gliders, etc.).

33. UAS Operations under Instrument Flight Rules, at night, or beyond VLOS are prohibited.

34. The UAs will not be operated from an elevated platform or moving device/ vehicle.

35. Before conducting operations, the radio frequency spectrum used for operation and control of the UA will comply with the Federal Communications Commission (FCC) or other appropriate government oversight agency requirements.

V. REGULATIONS FROM WHICH EXEMPTION IS REQUESTED

The Federal Aviation Act expressly grants the FAA the authority to issue exemptions. This statutory authority, by its terms, includes exempting civil aircraft, as the term is defined under § 40101 of the Act, including UASs, from its safety regulations and minimum standards when the Administrator decides a requested exemption is in the public interest.[3]

Dronair seeks an exemption from several interrelated provisions of Title 14 of the Code of Federal Regulations ("14 C.F.R") Parts 21, 45, 61 and 91 for purposes of conducting the requested operations using a UAS. Listed below are: (1) the specific sections of 14 C.F.R for which exemption is sought, and (2) the operating procedures and safeguards that Petitioner has established which will ensure a level of safety better than or equal to the rules from which exemption is sought.[4]

[3] 49 U.S.C. § 44701(f) (authorizing the grant of exemptions from requirements of regulations prescribed pursuant to Sections 44701(a) and (b) and Sections 44702 - 44716).

[4] 14 C.F.R § 11.81(e), which requires a petition for exemption to include:

> The reasons why granting the exemption would not adversely affect safety, or how the exemption would provide a level of safety at least equal to that provided by the rule from which you seek exemption.

UNMANNED AIRCRAFT SYSTEM

A. 14 C.F.R. Part 21, Subpart H – Airworthiness Certificates and 14 C.F.R. § 91.203(a)(1)

The FAA has stated that no exemption is needed from this section if a finding is made under the Reform Act that the UAS selected provides an equivalent level of safety when compared to aircraft normally used for the same application. These criteria are met, and therefore no exemption is needed.[5] If, however, the FAA determines that there are some characteristics of the chosen UAS that fail to meet the requirements of the Reform Act, an exemption is requested.

Equivalent Level of Safety

Dronair's use of the DJI S1000+ and SkyRanger is safe when taking into account their size, weight, speed, and operational capability. As set forth in the description of proposed operations in Section IV(A), the SkyRanger weighs less than 10 pounds and the DJI S1000+ weighs less than 25 pounds, including payload and will not be flown at a ground speed in excess of 50 knots. Both UASs are also equipped with safety features that will allow Petitioner to operate the UAS safely after experience certain in-flight contingencies or failures.[6] [7]

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[5] *See* Grant of Exemption No. 11062 to Astraeus Aerial (FAA-2014-0352 at pgs. 13-14, 22).

[6] *See e.g.*, Grant of Exemption No. 11184 to LowCountryRC, Corp. (FAA-2014-0803 at pg. 3):

> "The [DJI S1000] has the capability to operate safely after experiencing certain in-flight contingencies or failures and uses an auto-pilot system to maintain UAS stability and control. The UAS is also able to respond to a loss of global positioning system (GPS) or a lost-link event with a pre-coordinated, predictable, automated flight maneuver, and manual flight control functionality as a backup. These safety features provide an equivalent level of safety compared to a manned aircraft performing a similar operation."

[7] *See e.g.*, Grant of Exemption No. 11184 to VDOS Global, LLC. (FAA-2014-0382 at pgs. 4-5):

> "The SkyRanger can be operated entirely by a touch-screen, map-based interface. This means the operator only needs to command the system where to go, and the system does all the flying for the operator. The SkyRanger can be operated in both semi and fully autonomous flight modes, with the operator simply clicking on a map to create a pre-planned flight path for a flight. In addition, the operator can create no fly zones or maximum flight ranges and altitudes so the system cannot enter areas

{footnote continued}

Additionally, the UASs carry neither pilots nor passengers, carry no explosive materials or flammable liquid fuels, and operate exclusively within the parameters stated in Dronair's Operations Manuals.

Operations conducted under this exemption will be closely controlled and monitored by the operator and will be conducted in compliance with local public safety requirements, to provide security for the area of operation. Dronair will also provide the FAA with advance notice of all operations via NOTAMs as required by the applicable COA. In all cases, operation of the DJI S1000+ and SkyRanger under the proposed conditions will be at least as safe as, or safer than, conventional rotorcraft operating with an airworthiness certificate.

Lastly, the UASs do not need a means to communicate with other aircraft or ATC, because those capabilities will be possessed by the PIC and Observer, who are not onboard the UAS.[8] In addition, no sense-and-avoid technology is necessary for the UASs because they will be operated at all times in VFR conditions and within VLOS of the PIC and Operator.[9]

B. 14 C.F.R. Part 27 Airworthiness Standards: Normal Category Rotorcraft

Title 14 C.F.R. Part 27 sets forth the procedural requirements for airworthiness certification of normal category rotorcraft. To the extent that Dronair's small UASs would otherwise require certification under Part 27, Petitioner seeks an exemption from Part 27's

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> deemed unsafe or unnecessary to fly over. The petitioner states further that the UAS has built-in intelligent fault handling which allows the SkyRanger to detect a system fault while in the air and automatically fly back to its takeoff location and land. Faults that can be detected include: loss of communication; exceeding pre-set wind thresholds; and low battery levels.
>
> All flight operations are global positioning system (GPS) controlled, making the system easy to navigate. At any point if the operator is not explicitly commanding the system to move, the system automatically holds its GPS position. The flight control system employs not only GPS positioning but a variety of sensors including sonar, barometric pressure, temperature, wind speed and others to ensure stability so long as wind thresholds are not exceeded. Also a flight termination link – to prevent a 'fly away' or other potentially dangerous situation – is available to the operator."

[8] *See* Grant of Exemption No. 11062 to Astraeus Aerial (FAA-2014-0352 at pg. 13).

[9] *Id.*

airworthiness standards for the same reasons identified in the request for exemption from 14 C.F.R. Part 21, Subpart H, *supra*.

C. 14 C.F.R. §§ 91.9(c), 45.23(b) and 45.27(a): Aircraft Marking and Identification Requirements

Dronair seeks an exemption from the aircraft marking and identification requirements contained in 14 C.F.R. §§ 91.9(c), 45.23(b) and 45.27(a).

- 14 C.F.R. § 91.9(c), Civil Aircraft Flight Manual, Marking and Placard requirements, provides that:

  > No person may operate a U.S.-registered civil aircraft unless that aircraft is identified in accordance with Part 45 of this chapter.

- 14 C.F.R. § 45.23(b), Markings of the Aircraft, states:

  > 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.

- 14 C.F.R. § 45.27(a), Rotorcraft, states:

  > Each operator of a rotorcraft must display on that rotorcraft horizontally on both surfaces of the cabin, fuselage, boom, or tail the marks required by § 45.23.

In a previous Grant of Exemption, the FAA determined that exemption from these requirements was warranted provided that the aircraft "have identification (N-Number) markings in accordance with 14 C.F.R Part 45, Subpart C if the markings are as large as practicable."[10]

Equivalent Level of Safety

All UA flown by Dronair will bear N-number markings that are as large as practicable in accordance with 14 C.F.R. Part 45, Subpart C.[11]

[10] FAA Docket No. FAA-2014-0352.

D. 14 C.F.R. § 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2); 91.417(a) and (b): Maintenance Inspections

Dronair seeks an exemption from the maintenance inspection requirements contained in 14 C.F.R. § 91.405(a), 91.407(a)(1), 91.409(a)(2); 91.417(a) and (b). These regulations specify maintenance and inspection standards in reference to 14 C.F.R. Part 43. *See, e.g.,* 14 C.F.R. § 91.405(a) (stating that each owner or operator of an aircraft "[s]hall have the aircraft inspected as prescribed in subpart E of this part and shall between required inspections …have discrepancies repaired as prescribed in part 43 of this chapter"). An exemption from these regulations is needed because Part 43 and these sections only apply to aircraft with an airworthiness certificate, which the UAS to be operated under this grant of exemption will not have.

Equivalent Level of Safety

An equivalent level of safety will be achieved because maintenance and inspections will be performed in accordance with the Manufacturer's Manual and any required manufacturer Safety or Service Bulletins. Further, as required by Dronair's Operations Manuals, the PIC will conduct a pre-flight inspection of the UAS and all associated equipment to account for all discrepancies and/or inoperable components. Maintenance will be performed and verified to address any conditions potentially affecting safe operation of the UAS and no flights will occur unless, and until, all flight critical components of the UAS have been found to be airworthy and in a condition safe for operation. A functional test flight will be conducted following the replacement of any flight-critical components. As required by Dronair's Operations Manuals, the PIC who conducts the functional test flight will make an entry in the UAS aircraft records of the flight.

Dronair's Operations Manual also includes requirements to follow the manufacturer's UAS aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements for the following applicable components: powertrain system (powerplant), propellers, avionics and control surfaces (including ailerons/elevons), structures & airframe, camera system, electrical systems (including batteries), ground control station, hazard accessories, and spare parts. Further, Dronair's Operations Manuals also includes procedures to document and maintain a record of the UAS maintenance, preventative maintenance, alterations, status of replacement /overhaul component parts, and the total time in service of the UASs used under this Grant of Exemption. As a whole, the maintenance and inspection procedures required in Dronair's Operations Manuals ensure that an equivalent or higher level of safety will be achieved.

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[11] *See, e.g.,* FAA Docket No. FAA-2014-0352, at 14.

PILOT-IN-COMMAND OF THE UAS

E. 14 C.F.R. § 61.113: Private Pilot Privileges and Limitations

Dronair seeks exemption from 14 CFR § 61.113, which restricts private pilot certificate holders from flying aircraft for compensation or hire, and would also require a second class medical certificate. The purpose of Part 61 is to ensure that the skill and competency of any PIC matches the airspace in which the PIC will be operating, as well as requiring certifications if the private pilot is carrying passengers or cargo for hire. In this case, while the UASs will be operated as part of a commercial operation, it carries neither passengers nor cargo. In the Grant of Exemption to Astraeus Aerial[12], the FAA determined that the unique characteristics of UAS operation outside of controlled airspace did not warrant the addition cost and restrictions attendant with requiring a the PIC to have a Commercial Pilot Certificate and Class II Medical Certificate. The fulfillment of the additional requirements for a private pilot to become qualified as a commercial pilot would not lead to any additional safety benefits when UAS operations are involved.

Equivalent Level of Safety

The restrictions Dronair has placed on its UAS operations meet or exceed the restrictions similarly imposed on Astraeus Aerial. Dronair will operate on private property away from persons and property not involved in the operation. Dronair will also obtain an ATO issued COA prior to conducting any operations under this Grant of Exemption. All operations will be conducted in accordance with airspace requirements in the ATO issued COA including class of airspace, altitude level and potential transponder requirements. A NOTAM will also be issued as required by the applicable COA.

In addition to these flight restrictions, Dronair will further ensure safe operation by requiring that any PIC be thoroughly versed not only in airspace and communication issues pertaining to all aircraft operators but also in the unique aspects of UAS flight. As set forth in the Operations Manuals, pilots will have experience not only in UAS operations generally but have logged flight time in the specific make and model used for the operations before they are permitted to participate in commercial flights on behalf of Dronair. The pilot qualification, training, and currency requirements in the Operations Manuals ensure that Dronair's pilots are competent and proficient in the UAS they are operating. Dronair's training and qualification requirements are consistent with those contained in prior FAA Section 333 Grants of Exemption, and will provide a higher level of competency and proficiency for its pilots and will ensure at least an equivalent level of safety.

[12] Exemption No. 11062 (FAA Docket No. FAA-2014-0352).

OPERATING PARAMETERS OF THE UAS

F. 14 C.F.R. § 91.7(a): Civil Aircraft Airworthiness

Inasmuch as there will be no airworthiness certificate issued for the UASs, Dronair seeks an exemption from 14 C.F.R. § 91.7(a), which requires that a civil aircraft be in airworthy condition to be operated. The FAA has stated that no exemption is required for 14 C.F.R. § 91.7(a) to the extent that the requirements of Part 21 are waived or found inapplicable.[13] Accordingly, Petitioner requests that the requirements for § 91.7(a) be treated in accordance with Section V(A), *supra.*

G. 14 C.F.R. § 91.9(b)(2): Civil Aircraft Flight Manual in the Aircraft and 14 C.F.R. § 91.203(a) and (b): Carrying Civil Aircraft Certification and Registration

Title 14 C.F.R. § 91.9(b)(2) and § 91.203(a) and (b) require the operator to carry airworthiness documents and other aircraft manuals onboard the aircraft. Pursuant to 14 C.F.R. § 91.9(b)(2):

> (b) No person may operate a U.S.-registered civil aircraft –
> …
> (2) For which an Airplane or Rotorcraft Flight Manual is 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.

Pursuant to 14 C.F.R. § 91.203(a) and (b):

> (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.

[13] *See id.* at 13-14, 22.

Given the small size and configuration of the UASs, it would be impossible to keep airworthiness documents and other aircraft manuals on board the UAS because there is simply no room and the UAS has no cabin or cockpit.

Equivalent Level of Safety

In an FAA Office of Chief Counsel's Opinion dated August 8, 2014, and prepared by Dean E. Griffith, Attorney, AGC-220, it was acknowledged that the intent of 14 C.F.R. 91.9(b) and 91.203(a) and (b) is met if the pilot of the unmanned aircraft has access to the UAS flight manual, registration certificate, and other required documents from the ground control station from which he or she is operating the aircraft.[14] As this FAA Office of Chief Counsel Opinion clarifies, the intent of the rule is to ensure the pilot has access to these key documents during flight. Therefore, an equivalent level of safety will be achieved by ensuring that the pilot has access to the documents at the ground control station from which he or she is piloting the UAS.

H. 14 C.F.R. § 91.103: Preflight Action

Dronair seeks an exemption from 14 C.F.R. § 91.103, which requires a PIC to become familiar with specific information before each flight, including information contained in the FAA-approved Flight Manual on board the aircraft. While the PIC will be familiar with all information necessary to safely conduct the flight, an exemption is requested to the extent that an FAA-approved Flight Manual is required.

Equivalent Level of Safety

An equivalent level of safety will be provided by following the Dronair's Operations Manuals and the Manufacturer's Manual. The PIC will perform a series of checklists designed to identify any defects or inoperable components in accordance with the Dronair's Operations Manuals, including checklists covering Pre-Flight, Launch, Landing, and Post-Flight procedures. The PIC will also be required to review weather, flight requirements, battery charge, landing and takeoff distance, UA performance data, and contingency landing areas—before initiation of flight. Dronair's Operations Manuals and the Manufacturer's Manual will be kept at the ground control station and will be accessible to the PIC at all times while operating the UAS.

I. 14 C.F.R. § 91.109(a): Flight Instruction

[14] Memorandum from Mark Bury, FAA Assistant Chief Counsel for International Law, Legislation and Regulation, to John Duncan, FAA Flight Standards Service (Aug. 8, 2014); *see also* Docket No. FAA-2014-0352 at 16-18.

Dronair seeks an exemption from 14 C.F.R. § 91.109(a), which provides in pertinent part that "[n]o 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." UASs and remotely piloted aircraft, by their design, do not have functional dual controls. Instead, flight control is accomplished through the use of a device that communicates with the aircraft via radio communications. Accordingly, an exemption will be required for the flight instruction requirements of 14 C.F.R. § 91.109(a).

Equivalent Level of Safety

Given the size and speed of the UASs that Dronair intends to use, an equivalent level of safe training can still be performed without dual controls because no pilot or passengers are aboard the UAS, and as required by the Dronair's Operations Manuals, all persons will be a safe distance away in the event that the UAS experiences any difficulties during flight instruction. Moreover, as required by the Dronair's Operations Manuals, all flight training will be conducted in controlled and sterile environment. As a whole, the safety procedures provided for in Dronair's Operations Manuals ensure that the proposed UAS operations provide an equivalent or higher level of safety than that provided by the flight instruction regulations.

J. 14 C.F.R. § 91.119(c): Minimum Safe Altitudes

Dronair requests an exemption from the minimum safe altitude requirements of 14 C.F.R. § 91.119(c).[15] Section 91.119 prescribes the minimum safe altitudes under which aircraft may not operate, including 500 feet above the surface and away from any person, vessel, vehicle, or structure in non-congested areas. *See* 14 C.F.R. § 91.119(c). Section 91.119(d) allows for a helicopter to operate at less than those minimum altitudes when it can be operated "without hazard to persons or property on the surface," provided that "each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA."

An exemption is required because the proposed UAS operations will normally need to occur below 400 feet AGL. In circumstances where the UAS is used to inspect a structure whose height exceeds 400 feet AGL, the UAS will not be operated more than 100 feet above the highest point on the structure, and within 50 feet horizontally of the structure. Additionally, due the nature of the proposed operations, the Pilot and/or Observers(s) may need to be less than 500 feet away from the UAS.

[15] Relief from § 91.119(a) will not be necessary because Petitioner will be able to perform an emergency landing without undue hazard to persons or property on the ground in the event of a failure. Petitioner's proposed UAS operations will not occur over congested areas, and therefore an exemption from § 91.119(b) will not be necessary. *See e.g.*, Grant of Exemption No. 11157 to Slugwear, Inc., dba Likeonatree Aerial (FAA-2014-0534 at 15).

Equivalent Level of Safety

Compared to flight operations with rotorcraft weighing far more than the maximum weights proposed herein, and given the lack of flammable fuel with the UASs, any risk associated with these operations is far less than those that presently exist with conventional aircraft. An equivalent level of safety will be achieved given the size, weight, and speed of the UASs, as well the controlled location where the operations will occur. In order to avoid any risk to manned aircraft, flight operations will be restricted to 400 feet AGL or below, or when inspecting a structure whose height exceeds 400 feet AGL, within 100 feet above the highest point on that structure and 50 feet horizontally of the structure.

As set forth in the Operations Manuals, the UASs will be operated in a restricted area, and all flights will be operated at a lateral distance of at least 500 feet from any nonparticipating persons, unless that person is in a position where he or she is shielded from the UAS and any possible debris resulting from UAS failure. As required by the Operations Manuals, flights will be terminated if a nonparticipating person within 500 feet of the UAS leaves a shielded position. Further, UAS operations will occur at least 500 feet away from vehicles or structures unless the property owner/controller has granted permission and the PIC has made a safety assessment of the risk of operating closer to those objects and, operations near the PIC or Observer will not present an undue hazard per § 91.119(a). Adherence to these restrictions in Dronair's Operations Manuals will ensure operations can be conducted without compromising safety.[16]

K. 14 C.F.R. § 91.121: Altimeter Settings

Dronair seeks an exemption from 14 C.F.R. § 91.121, which requires a person operating an aircraft to maintain cruising altitude or flight level by reference to an altimeter that is set to

[16] *See e.g.*, Grant of Exemption No. 11138 to Douglas Trudeau (FAA-2014-0481 at 19):

> "If barriers or structures are present that can sufficiently protect nonparticipating persons from the UA or debris in the event of an accident, then the UA may operate closer than 500 feet to persons afforded such protection. The operator must also 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. When considering how to immediately cease operations, the primary concern is the safety of those nonparticipating persons. In addition, the FAA finds that operations may be conducted closer than 500 feet to vessels, vehicles and structures when the owner/controller of any such vessels, vehicles or structures grants permission for the operation and the PIC makes a safety assessment of the risk of operating closer to those objects and determines that it does not present an undue hazard."

the elevation of the departure airport or barometric pressure. An exemption is required to the extent that the UASs do not have a barometric altimeter, but rather a GPS altitude read out.

Equivalent Level of Safety

The FAA has stated that an equivalent level of safety to the requirements of 14 C.F.R. § 91.121 can be achieved in circumstances where: (1) the UASs will be operated below 400 feet AGL or below[17], (2) within VLOS, (3) where GPS based altitude information is relayed in real time to the operator at a ground-based on-screen display and, (4) where prior to each flight, a zero altitude initiation point is established for the PIC to confirm accuracy of the onboard GPS.[18]

The UASs that Dronair intends to use for the proposed operations will meet all these operational characteristics. Moreover, as required by Dronair's Operations Manuals, the PIC will be required to calibrate the aircraft's GPS compass prior to each flight operation. Like prior FAA Section 333 Grants of Exemption, the UASs Dronair intends to use, and the safety mitigation procedures contained in the Operations Manuals, both ensure that an equivalent level of safety will be achieved, and a Grant of Exemption to the requirements of § 191.121 is therefore appropriate.

L. 14 C.F.R. § 91.151(a): Fuel Requirements for Flight in VFR Conditions

Dronair requests an exemption from 14 C.F.R. § 91.151(a)'s fuel requirements for flight in VFR conditions. Section 91.151 states:

> (a) No person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed –
>
> (1) During the day, to fly after that for at least 30 minutes; or
>
> (2) At night, to fly after that for at least 45 minutes.

Here, the technological limitations on UAS battery power means that no meaningful flight operations can be conducted while still maintaining a 30-minute battery reserve. An exemption from the fuel requirements of 14 C.F.R. § 91.151(a) is therefore required.

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[17] If the height of the structure being inspected exceeds 400 feet AGL, the UAS will not be operated more than 100 feet above the highest point on the structure.

[18] *See* Grant of Exemption No. 11062 to Astraeus Aerial (FAA-2014-0352 at 21).

Equivalent Level of Safety

In the Grant of Exemption to VDOS (Exemption No. 11112), the FAA determined that an equivalent level of safety to the fuel requirements for flight in VFR conditions could be achieved by prohibiting the PIC from beginning a SkyRanger flight unless (considering wind and forecast weather conditions) there was enough power to fly to the first intended point of landing and, assuming normal cruising speed, to fly after that for at least 10 minutes. In reaching this conclusion, the FAA considered that the UAS batteries for the SkyRanger provided provide approximately 50 minutes of powered flight (with payload) and provided battery level and battery time remaining in minutes and seconds to the PIC.[19] The FAA also considered the fact that the SkyRanger operating manual states: "start every flight with a fully charged battery in the aerial vehicle", and that in the event that the UAS should run low on power, the PIC will be alerted and can land the SkyRanger as soon as possible. Like the VDOS Grant of Exemption, Dronair's use of the SkyRanger, combined with the requirements of Petitioner's Operations Manuals, ensure that an equivalent level of safety can be achieved.

Similarly, in the Grant of Exemption to Alan Purwin (Exemption No. 11161), the FAA determined that an equivalent level of safety to the fuel requirements for flight in VFR conditions could be achieved by prohibiting the PIC from beginning a flight with the DJI S1000+ unless (considering wind and forecast weather conditions), there was enough power to fly at normal cruising speed to the intended landing point and land the UA with 25% battery power remaining. Dronair will adhere to this limitation for DJI S1000+ flights.

The DJI S1000+ includes a low battery warning system and the amount of battery reserve power remaining is transmitted to the PIC via telemetric data feed, which downlinks from the UAS to a ground-based-on-screen display.[20] As required by Dronair's Operations Manuals, the PIC will promptly fly the UAS back to the home launch location or pre-determined abort location where the UAS may safely land, while still maintaining a minimum of 25% reserve battery power. Dronair submits that the procedures requiring flights to be safely terminated once the batteries fall below 25% capacity, combined with the requirement that flights only be conducted within a secure, isolated area, using a UAS weighting less than 25 pounds, and within VLOS of the PIC and Observer(s), ensure that the proposed operation will provide an equivalent or higher level of safety to that provided by the regulations from which exemption is sought.

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[19] Grant of Exemption No. 11112 to VDOS Global, LLC (FAA-2014-0382 at 10).

[20] The SkyRanger ground control station displays, the UASs position, navigation route, tail number, altitude, heading, north seeking arrow, range to targets, calculated target position, date/time. and sensor heading and orientation relative to the UAS.

VI. DRUG AND ALCOHOL PROGRAM

Dronair will have policies in place to ensure that no person may participate in UAS flight operations if they are under the influence of alcohol or any drug.

VII. PUBLIC INTEREST

The public interest will be served by granting Dronair's Petition for Exemption. Congress has established a national policy that favors early integration of UAS into the NAS in controlled, safe working environments such as those proposed in this Petition. Granting this Petition for Exemption helps fulfill Congress' goal in passing Section 333(a) through (c) of the Reform Act—the FAA Administrator's assessment of whether certain UAS may operate safely in the NAS before completion of the statutorily required rulemaking.

The proposed UAS operations in this Petition for Exemption significantly improve safety and reduce risk harm or serious injury to inspecting engineers. Traditional methods of inspecting monitoring industrial and construction sites, and utility power-generation facilities and infrastructure requires inspectors to climb towers or otherwise perform elevated work, which exposes them to the risk of dangerous falls. Inspectors are often exposed to hazardous chemicals or oxygen-deficient atmospheres, burns from steam or from hot equipment, and other mechanical hazards associated with industrial sites and construction facilities. The use of small UASs can eliminate these hazards and is ultimately a much safer method of performing these types of inspections.

The use of small UASs also enhances safety and reduces risk because, unlike manned aircraft weighing thousands of pounds, carrying crew in addition to flammable fuel, the UASs carry no passengers or crew. Further, in the unlikely event of an accident, Dronair's small battery powered UASs presents significantly less danger to persons on the ground when compared to operations by conventional manned aircraft.[21] As Petitioner's UASs are battery powered, the public will also benefit from a reduction in harmful emissions associated with conventional aircraft performing in the same functions proposed herein. Lastly, as recognized by

[21] *See* Grant of Exemption No. 11158 to Team 5, LLC (FAA-2014-0783 at 12):

> "Manned helicopters conducting aerial filming can weigh 6,000 pounds or more and are operated by an onboard pilot, in addition to other onboard crewmembers, as necessary. The petitioner's UAs will weigh less than 55 pounds with no onboard pilot or crew. The pilot and crew will be remotely located from the aircraft. The limited weight significantly reduces the potential for harm to participating and nonparticipating individuals or property in the event of an incident or accident. The risk to an onboard pilot and crew during an incident or accident is eliminated with the use of a UA for the aerial filming operation."

the FAA in prior Section 333 Grants of Exemption to filmmakers, UASs provide an additional tool for the aerial filming industry, adding a greater degree of flexibility, which supplements the current capabilities offered by manned aircraft.[22]

VIII. PRIVACY

All Dronair UAS operations will be conducted in accordance with applicable federal, state, or local laws regarding privacy. All operations shall be conducted over private or controlled-access property with permission from the land owner/controller or authorized representative. Permission from land owner/controller or authorized representative will be obtained for each flight to be conducted.

IX. FEDERAL REGISTER SUMMARY

Pursuant to 14 C.F.R. Part 11, the following summary is provided for publication in the FEDERAL REGISTER, should it be determined that publication is needed:

Petitioner seeks an exemption from the following rules in Title 14 of the Code of Federal Regulations:

Part 21, Subpart H; Part 27; 45.23(b); 45.27(a); 61.113; 91.7(a); 91.9(b)(2); 91.9(c); 91.103; 91.109(a); 91.119(c); 91.121; 91.151(a); 91.203 (a) & (b); 91.405(a); 91.407(a)(1); 91.409(a)(1) & (2); 91.417 (a) & (b).

The exemption will enhance safety by reducing risk to the general public and property owners from the substantial hazards associated with performing equivalent film work and aerial inspection and environmental monitoring of industrial sites, transmission and storage facilities, construction facilities and precision aerial surveys with conventional fixed-wing aircraft, rotorcraft, or other methods.

X. CONCLUSION

Dronair's Petition for Exemption satisfies the criteria articulated in Section 333 of the Reform Act of 2012 including weight, speed, operating capabilities, proximity to airports and populated areas, operation within VLOS and national security. The proposed UAS operations will benefit the public as a whole by improving safety and reducing risk by alleviating human exposure to danger. In consideration of the foregoing, this Petition for Exemption provides the FAA with more than adequate justification for granting the requested exemptions allowing Dronair to use small UASs for: (1) scripted, closed-set filming for the motion picture, television,

[22] *See e.g.*, Grant of Exemption No. 11178 to Picture Factory, Inc. (FAA-2014-0794 at 18).

and web industry, and; (2) aerial inspection and environmental monitoring of industrial sites, transmission and storage facilities, construction facilities and precision aerial surveys.

We thank you for your prompt consideration of our requested exemptions. Should you have any questions, or if you need any additional information to support the requested exemptions, please contact the undersigned or John McGraw at:

John McGraw Aerospace Consulting, LLC
Phone: 540-219-1638
Email: john@jmacaerospace.aero

Very truly yours,

/s/ Matthew J. Clark
Matthew J. Clark
Mark E. McKinnon
Counsel for Dronair Solutions

(The following attached items contain proprietary and commercial information exempt from disclosure under the Freedom of Information Act, 5 U.S.C. § 522 *et seq.*, and should be held in a separate file pursuant to 14 C.F.R. § 11.35(b)).

Attachments:

Dronair sUAS Flight Operations Manual

Dronair DJI S1000+ sUAS Aircraft Flight Manual

Dronair Aeryon SkyRanger sUAS Aircraft Flight Manual