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

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

August 27, 2015

Exemption No. 12640
Regulatory Docket No. FAA−2015−2422

Mr. Doug Andriuk
Revolution UAS, LLC
14812 North 60th Street
Scottsdale, AZ 85254

Dear Mr. Andriuk:

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 May 27, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Revolution UAS, LLC (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial photography and videography used to support a broad variety of inspection and ground truth 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 is a 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[1]. The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grants of Exemption Nos. 11062 to Astraeus Aerial (*see* Docket No. FAA−2014−0352), 11109 to Clayco, Inc. (*see* Docket No. FAA−2014−0507), 11112 to VDOS Global, LLC (*see* Docket No. FAA−2014−0382), and 11213 to Aeryon Labs, Inc. (*see* Docket No. FAA−2014−0642), the FAA found that the enhanced safety achieved using an unmanned aircraft (UA) with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

Having reviewed your reasons for requesting an exemption, I find that—

- They are similar in all material respects to relief previously requested in Grant of Exemption Nos. 11062, 11109, 11112, and 11213;
- The reasons stated by the FAA for granting Exemption Nos. 11062, 11109, 11112, and 11213 also apply to the situation you present; and
- A grant of exemption is in the public interest.

Our Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701, delegated to me by the Administrator, Revolution UAS, 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 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.

[1] Aerial data collection includes any remote sensing and measuring by an instrument(s) aboard the UA. Examples include imagery (photography, video, infrared, etc.), electronic measurement (precision surveying, RF analysis, etc.), chemical measurement (particulate measurement, etc.), or any other gathering of data by instruments aboard the UA.

Conditions and Limitations

In this grant of exemption, Revolution UAS, 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 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.ntsb.gov.

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

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

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

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

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

This exemption terminates on September 30, 2017, unless sooner superseded or rescinded.

Sincerely,

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

Enclosures

REVOLUTION UAS LLC
ELEVATE YOUR PERSPECTIVE

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May 27, 2015

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

Re: Petition of Revolution UAS, LLC for an Exemption Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 ("Reform Act") and 14 C.F.R. Part 11**,** Revolution UAS, LLC, hereby applies for an exemption from the Federal Aviation Regulations ("FARs") identified below, to allow commercial operations of small unmanned aerial vehicles *(i.e.,* "small unmanned aircraft" or "UAS").

This exemption is made based on the information in this petition, as well as the accompanying Revolution UAS Operations, Maintenance and Safety Manual ("Operations Manual") Petitioner submits this supporting material as confidential documents under 14 C.F.R. *§* 11.35(b), as they contain confidential commercial and proprietary information that the Petitioner has not and will not share with others. Similarly, these documents contain operating conditions and procedures that are not available to the public and are protected from release under the Freedom of Information Act, 5 U.S.C. § 552 *et seq.*, and any other requirements established by the FAA pursuant to Section 333 of the FAA Reform Act.

This exemption request will permit Revolution UAS LLC, to operator commercially for the purpose of collecting aerial photography and videography used to support a broad variety of inspection and ground truth operations.

We request a summary grant, as we have designed our petition, operations, and chosen UAV to not set precedent over previously approved exemptions.

For your convenience, the petition is organized as follows:

a. 14 C.F.R. Part 21, Subpart H- Airworthiness Certificates and 14 C.F.R. § 91.203
b. 14 C.F.R. Part 27 Airworthiness Standards: Normal Category Rotorcraft
c. 14 C.F.R. § § 91.9(c), 45.23(b) and 45.27(a): Aircraft Marking and Identification Requirements
d. 14 C.F.R. § 91.9(b)(2): Civil Aircraft Flight Manual in the Aircraft
e. 14 C.F.R. § 91.203 (a) & (b): Carrying Civil Aircraft Certification and Registration.
f. 14 C.F.R. § 91.7(a): Civil Aircraft Airworthiness
g. 14 C.F.R. § 91.103: Preflight Action
h. 14 C.F.R. § 91.109(a): Flight Instruction
i. 14 C.F.R. § 91.119: Minimum Safe Altitudes
j. 14 C.F.R. § 91.121: Altimeter Settings
k. 14 C.F.R. § 91.151(a): Fuel Requirements for Flight in VFR Conditions
l. 14 C.F.R. § 91.405(a), 91.407(a)(1), 91.409(a)(2); 91.417(a) and (b): Maintenance Inspections
m. 14 CFR § 61.113 Private Pilot Privileges and Limitations

VI. Drug and Alcohol Policy
VII. Privacy
VIII. Federal Register Summary
IX. Conclusion

I. Description of Petitioner

Revolution UAS LLC. "Revolution UAS", is headquartered in Scottsdale, AZ and was founded by two military veterans with significant military and civilian aviation experience. Revolution UAS seeks the requested exemptions in order to provide optical and thermal sensor data acquired from UAS platforms to perform light industrial inspection, survey and ground truth photography and videography.

Revolution UAS employs a DJI s900 with 3D Robotics Pixhawk flight controller. A complete description of the system is included in the attached operations manual. The S900 has received approval for use in Exemption 11326 (PPL Electric Utilities Corp), and Exemption 11400 (McKenna Long & Aldridge LLP). Our proposed use is similar in all material respects as those being used in Exemption Nos. 11062, 11109, 11112, and 11213.

II. Public Interest

Revolution UAS has performed significant market research, partnering with local companies to understand and leverage the utility of unmanned systems to reduce risk, cost and improve efficiency. As described below, the requested exemption would authorize Revolution UAS to perform commercial UAS operations within the NAS that will provide the following benefits:

a. Commercial use of UAS to perform aerial data gathering in support of the following industries: Construction site photography and mapping, precision

agriculture, pipeline/power line transmission/distribution towers, tower inspection, manmade/natural disaster damage assessment, support to first responders, security, construction, research, wildlife and wildfire monitoring, real estate, local infrastructure such as bridges, surveying, scientific studies, insurance functions, training, mining and UAS research and development. All of these activities are critical to the well-being of the general public.

b. The use of an UAS provides much improved data for decision making. The technical combination of platform, sensor and software, allows us to rapidly acquire and organize data that previously had to be obtained by manned inspection, such as roof or tower inspection.

c. The use of UAS will decrease congestion in the NAS along with reducing the noise/air pollution generated during traditional manned aircraft flight operations. Many of the operations proposed in this petition for exemption are currently achieved by aircraft or rotorcraft flying at low altitudes.

d. Operation of UAS may substantially reduce the risk to life and property by performing missions that are currently being performed by manned aircraft that are considered dangerous (i.e., transmission tower inspections or operating in extreme terrain or weather conditions). In the absence of a UAS, many of these inspections would have to be carried out by a helicopter or by sending someone up to perform the inspection manually. Utility inspections by helicopter are carried out at speed up to 70 knots, and the consequences of a wire strike or other collision is much greater than with the UAS. Moreover, conducting helicopter inspections at certain locations, such as substations where several transmission lines converge, carry additional risks to helicopters.

Petitioner's Address:

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II. Relevant Statutory Authority

This petition for exemption is submitted in accordance with the Section 333(a) through (c) of the FAA Modernization and Reform Act of 2012. 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 Airspace System ("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 its 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).

III. Revolution UAS' Proposed UAS Operations Meet the Requirements of Section 333 of the Reform Act.

The proposed operations in this petition for exemption qualify for expedited approval under Section 333 of the Reform Act. Each of the statutory criteria and other relevant factors are satisfied.

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

Revolution UAS will employ the DJI S-900 for its infrastructure inspection operations. This UAS has a maximum take-off weight of 24 pounds. The UAS's flight speed will not exceed 30 miles per hour, and it will not be flown in controlled airspace or at an altitude that exceeds 400 feet AGL. All flights will be flown in such a way that they can be safely terminated with a reserve battery power of 25% maximum charge. The DJI S-900 do not carry any flammable propellant or fuel.

The DJI S-900 also has redundant motor capabilities, and the vehicle is still capable of flight in the event a motor fails unexpectedly. The vehicle is capable of compensating for an engine loss automatically and action is not required by the PIC.

The DJI S-900 also has features that can alert the PIC to the possibility of a lost link before it occurs. Because the video link is at a shorter wavelength than the control links, it is more susceptible to loss than the control link. Loss of the video signal warns the PIC that action should be taken to ensure continued control. In the event the control link is lost, the UAS is also equipped with a failsafe setting that permits the vehicle to return to a preselected home point.

Given the small size of the selected UAS and the restricted environment within which they will operate, this petition for exemption falls within the zone of safety, *i.e.*, an equivalent level of safety, in which Congress directed the FAA to permit commercial UAS operations by exemption pending completion of formal rulemaking.

b. Approval is Warranted Based on the Operational Restrictions Set Forth in the Operations Manual

The Revolution UAS Operations Manual and manufacturer's maintenance and flight manuals contain all of the procedures and limitations necessary to successfully perform the proposed operation. To assist the FAA in its safety assessment of Revolution UAS's operations, below is a summary of operational limitations and conditions which will ensure an equivalent or higher level of safety for operations conducted under current regulatory guidelines:

1. The UAS will adhere to it published maximum takeoff weight as outlined in in the operations manual.

2. The radio frequencies used for operations and control of the UAS will comply with the Federal Communications Commission ("FCC") or other appropriate government oversight agency requirements.

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

4. The UAS shall be operated within Visual Line of Sight ("VLOS") of the PIC and VO at all times. The PIC will use human vision unaided by any device other than corrective lenses.

5. The VO designated for any operation will be in constant voice contact with the PIC.

6. The additional requirements identified in the exemption grant shall be added to the Revolution UAS' Operations Manuals. The Operations Manual will be maintained and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in the granted exemptions and the Revolution UAS Operations Manuals, the conditions and limitations in the granted exemptions shall take precedence and must be followed. Otherwise, Revolution UAS must follow the procedures outlined in their Operations Manuals.

7. Maximum total flight time for each operational flight will be limited to the amount of time the UAS can be flown and still maintain a reserve battery power of no less than 25%.

8. Flights will be operated at an altitude of no more than 400 feet AGL and will not be conducted within navigable airspace.

9. Flights will be operated at a lateral distance of at least 500 feet from any inhabited structures, buildings, vehicles or vessels, or from people not associated with the operation who have not given permission in advance of the operation.

10. The Pilot will have a private pilot's license, will be trained in accordance with the Operations Manual and will pass a company imposed flight evaluation.

11. The Visual Observer designated for any operation will be required to complete the training course as set forth in the Operations Manual before performing his duties on any flight.

12. The UAS will operate in accordance with the safety and operational requirements of the Operations Manual and manufacturer's flight manual.

13. Prior to the operation, a Mission Plan will be created setting forth the limitations for the flight as well as contact and hazard information provided by the utility.

14. A NOTAM will be issued not more than 72 hours in advance of flight, but not less than 48 hours before flight.

15. The PIC and Visual Observer will at all times be able to communicate by voice.

16. A Certificate of Authorization will be obtained prior to flight.

17. 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.

18. The operator will coordinate all flights with the appropriate Flight Standards District Office.

19. If the UAS loses communications or loses its GPS signal, the UAS will have the capability to return to a pre-determined location within the operational area and land.

20. Contingency plans will be in place to safely terminate flight if there is a loss of communication between the pilot and the observer.

21. The UAS will have the capability to safely abort flight in the case of unpredicted obstacles or emergencies. The PIC will abort the flight in the event of unpredicted obstacles or emergencies in accordance with the Revolution UAS' Operations Manuals.

IV. Regulations from which exemption is requested and equivalent level of safety

a. 14 C.F.R. Part 21, Subpart H: Airworthiness Certificates 14 CFR § 91.203(a)(1)

The regulation requires:

Subpart H, entitled Airworthiness Certificates, establishes the procedural requirements for the issuance of airworthiness certificates as required by FAR §91.203 (a) (1). Given the size and limited operating area associated with the aircraft to be utilized by the Applicant, an exemption from Part 21 Subpart H meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the Reform Act. The Federal Aviation Act (49 U.S.C.§44701 (f)) and Section 333 of the Reform Act both authorize the FAA to exempt aircraft from the requirement for an airworthiness certificate, upon consideration of the size, weight, speed, operational capability, and proximity to airports and populated areas of the particular UAS. In all cases, an analysis of these criteria demonstrates that the UAS operated without an airworthiness certificate, in the rural sparsely populated environment and under the conditions proposed will be at least as safe, or safer, than a conventional aircraft (fixed wing or rotorcraft) operating with an airworthiness certificate without the restrictions and conditions proposed.

Equivalent Level of Safety:

The UAS to be operated is less than 55 lbs. fully loaded, carries neither a pilot nor passenger, carries no explosive materials, and operates exclusively within a secured area as set out in the Manual. Unlike other civil aircraft, the proposed operations in this petition for exemption will be controlled and monitored by the operator, pursuant to the Manual's requirements. Moreover, the FAA will have advance notice of all operations conducted under this exemption.

These safety enhancements, which already apply to civil aircraft operated in connection with existing inspection operations, provide a greater degree of safety to the public and property owners than conventional operations conducted with airworthiness certificates issued under 14 C.F.R. Part 21, Subpart H. Lastly, application of these same criteria demonstrates that there is no credible threat to national security posed by the UAS, due to its size, speed of operation, location of operation, lack of explosive materials, and inability to carry a substantial external load.

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

14 C.F.R. Part 27 sets forth the procedural requirements for airworthiness certification of normal category rotorcraft. To the extent the Petitioner's UASs would otherwise require certification under Part 27, as a rotorcraft, Petitioner requests an exemption from Part 27’s airworthiness standards for the same reasons identified in the exemption request from 14 C.F.R. Part 21, Subpart H.

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

The regulation requires:

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 its 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 CFR part 45, Subpart C if the markings are as large as practicable." FAA Docket No. FAA-2014-0352.

Note:

Even though the UAS will have no airworthiness certificate, an exemption may be needed as the UAS will have no entrance to the cabin, cockpit or pilot station on which the word “Experimental” can be placed. Given the size of the UAS, two-inch lettering will be impossible. The word “Experimental” will be placed on the vehicle frame in compliance with §45.29 (f).

Equivalent level of safety:

The equivalent level of safety will be provided by marking the sUAV’s appropriate identification with lettering as large as practicable. The FAA has issued the following exemptions to this regulation to Exemptions Nos. 10700, 8738, 10167 and 10167A.

d. 14 C.F.R. § 91.9(b)(2): Civil Aircraft Flight Manual in the Aircraft.

The regulation provides:

14 C.F.R. § 91.9(b)(2), which states:

(b) No person may operate a U.S.-registered civil aircraft

(2) For which an Airplane or Rotorcraft Flight Manual is not required by §21.5 of this chapter, unless there is available in the aircraft a current approved airplane or Rotorcraft Flight
Manual, approved manual material, markings, and placards, or any combination thereof.

Given its size, configuration, and load capacity, the UAS has no ability to carry such a manual on the aircraft, not only because there is no pilot on board, but because there is simply no room or capacity to carry such an item on the aircraft.

Equivalent Level of Safety

The safety related purpose of this manual requirement can be equally satisfied by maintaining the UAS flight manual at the ground control point where the pilot flying the UAS will have immediate access to it. Accordingly, Petitioner requests an exemption from §91.9(b)(2)'s flight manual requirements, on the condition that the UAS flight manual be available at the control point during each operation.

The FAA has issued the following exemptions to this regulation: Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 9565B, 10167, 10167A, 10602, 32827, and 10700.

e. 14 C.F.R. § 91.203 (a) & (b): Carrying Civil Aircraft Certification and Registration.

The regulation provides:

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.

In addition to the fact that Petitioner is seeking an exemption from the airworthiness certificate requirements, an exemption to this regulation is necessary because (a) the UAS's load capacity and size does not allow it to carry certification and registration documents; (2) the UAS does not have a cabin or cockpit entrance at which the documents could be displayed; and (3) there are no passengers or crew for whom the certificates need be displayed.

Equivalent Level of Safety:

To the extent these regulations are applicable to the proposed UAS operations, an equivalent level of safety will be achieved by keeping these documents at the ground control point where the pilot flying the UAS will have immediate access to them.

The FAA has issued numerous exemptions to this regulation. A representative sample of other exceptions includes Exemption Nos. 9565, 9665, 9789, 9789A, 9797, 9797A, 9816A, and 10700.

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

The regulation provides:

14 C.F.R. § 91.7(a), which requires that a civil aircraft be in an airworthy condition to be operated.

Equivalent Level of Safety:

As there will be no airworthiness certificate issued for the aircraft, should this exemption be granted, no FAA regulatory standard will exist for determining airworthiness. Given the size of the aircraft and the requirements contained in the DJI S900 & S1000 User's Manual for maintenance and use of safety check lists prior to each flight.

The FAA has issued the following exemptions to this regulation: Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 9565B, 10167, 10167A, 10602, 32827, and 10700.

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

The regulation provides:

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 Aircraft Operations Manual and flight manual provided by the manufacturer. The PIC will take all required preflight actions- including performing all required checklists and reviewing weather, flight battery requirements, landing and takeoff distance, aircraft performance data, and contingency landing areas - before initiation of flight. The Aircraft Operations Manual and manufacturer's flight manual will be kept at the ground station with the operator at all times.

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

The regulation provides:

14 C.F.R. § 91.109(a): which provides 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.

Equivalent Level of Safety[DA1]:

Given the size and speed of the UAS, an equivalent level of safe training can still be performed without dual controls because no pilot or passengers are aboard the UAS, and all persons will be a safe distance away in the event that the UAS experiences any difficulties during flight instruction.

The FAA has approved exemptions for flight training without fully functional dual controls for a number of aircraft and for flight instruction in experimental aircraft. See Exemption Nos. 5778K & 9862A.

i. 14 C.F.R. § 91.119: Minimum Safe Altitudes

The regulation provides:

14 C.F.R. § 91.119. 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."

Equivalent Level of Safety:

Risk is significantly reduced compared to flight operations with rotorcraft weighing far more than the maximum UAS weight proposed herein, and given the lack of flammable fuel, 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 UAS, as well as the location where it is operated. In order to avoid any risk to aircraft, flight operations will be restricted to 400' AGL or below. As set forth in the Manual, the UAS will be operated in a restricted area, away from persons or structures not involved in the operation.

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

The regulation provides:

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 the elevation of the departure airport or barometric pressure. An exemption is required to the extent that the UAS does 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 can be achieved if the UAS will be operated at 400' or below and within visual line-of-sight in addition to GPS based altitude information relayed in real time to the operator. See Grant of Exemption to Astraeus Aerial, Docket No. FAA-2014-0352. As the attached Operations Manual indicates, the chosen UAS meets these requirements, and a zero altitude initiation point will be obtained prior to flight.

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

The regulation provides:

14 C.F.R.§ 91.151(a) 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 reserve. Revolution UAS proposes that all flights comply with this requirement by mandating that the aircraft be safely landed with no less than 25% of battery life remaining.

Equivalent Level of Safety:

The FAA has stated that an equivalent level of safety is provided if the UAS flight is terminated with at least 25% reserve battery power still available. See Grant of Exemption to Astraeus Aerial, Docket No. FAA-2014-0352. The Operations Manual conforms to this limit, providing an equivalent level of safety.

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

The regulation provides:

14 C.F.R. §§ 91.405(a); 91.407(a)(1); 91.409(a)(2); 91.417 (a) & (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 that 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 to these regulations is needed because Part 43 and these sections apply only to aircraft with an airworthiness certificate, which the UAS 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 Aircraft Operations Manual as referenced in the available Manual. As provided in the Manual, the operator will ensure that the UAS is in working order prior to initiating flight, perform required maintenance, and keep a log of any maintenance performed. The operator is the person most familiar with the aircraft and best suited to maintain the aircraft in an airworthy condition to provide the equivalent level of safety.

If mechanical issues arise, the UAS can land immediately and will be operating from no higher than 400 feet AGL. Moreover, the UAS's small size, carrying capacity, and the fact that flight operations will only take place in restricted areas for limited periods of time, create less risk than the same factors associated with conventional fixed-wing aircraft and rotorcraft performing the same operation.

m. 14 C.F.R. § 61.113 (a) and (b): Private Pilot Privileges and Limitations: Pilot in Command.

The regulation provides:

§§ 61.113 (a) and (b), which states:

> (a) Except as provided in paragraphs (b) through (h) of this section, no person who holds a private pilot certificate may act as pilot in command of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as pilot in command of an aircraft.
>
> (b) A private pilot may, for compensation or hire, act as pilot in command of an aircraft in connection with any business or employment 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.

Equivalent Level of Safety:

As required by the Manual, Petitioner's UAS operators acting as PIC will hold either an airline transport, commercial, private, recreational, or sport pilot certificate. Because the UAS

will not carry a pilot or passengers, the proposed operations can achieve the equivalent level of safety to 14 C.F.R. §§ 61.113 (a) and (b).

Unlike a conventional aircraft that carries the pilot and passengers, the UAS is remotely controlled with no passengers on board. Moreover, the area of operation is controlled and restricted, and all flights are planned, coordinated, and briefed to the appropriate official in advance as set forth in the Manual.

Revolution UAS can achieve an equivalent level of safety as achieved by current Regulations because the UAS do not carry any pilots or passengers. Further, while helpful, a pilot license will not ensure remote control piloting skills, though Revolution UAS's training program will ensure the PIC has substantial experience on the airframe. The risks inherent to the operation UAS are far less than the risk levels in the commercial activities outlined in 14 C.F.R. § 61, *et seq.* Thus, allowing Revolution UAS to operate its UASs as proposed will exceed current safety levels in relation to 14 C.F.R. §§ 61.113 (a) and (b).

VI. DRUG AND ALCOHOL POLICY

Revolution UAS 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. PRIVACY

All Revolution UAS operations will be conducted in accordance with applicable federal, state, or local laws regarding privacy. All operations conducted over private or controlled-access property with permission from the land owner/controller or authorized representative.

VIII. SUMMARY OF SECTION 333 EXEMPTION REQUEST

Revolution UAS hereby provides pursuant to Part 11 a summary of its exemption application to allow commercial operation of the Inspire unmanned aircraft in precision aerial survey work. An exemption is requested from the following regulations:

- 14 C.F.R. Part 21, Subpart H- Airworthiness Certificates and 14 C.F.R. § 91.203
- 14 C.F.R. Part 27 Airworthiness Standards: Normal Category Rotorcraft
- 14 C.F.R. § § 91.9(c), 45.23(b) and 45.27(a): Aircraft Marking and Identification Requirements
- 14 C.F.R. § 91.9(b)(2): Civil Aircraft Flight Manual in the Aircraft
- 14 C.F.R. § 91.203 (a) & (b): Carrying Civil Aircraft Certification and Registration.
- 14 C.F.R. § 91.7(a): Civil Aircraft Airworthiness
- 14 C.F.R. § 91.103: Preflight Action
- 14 C.F.R. § 91.109(a): Flight Instruction
- 14 C.F.R. § 91.119: Minimum Safe Altitudes
- 14 C.F.R. § 91.121: Altimeter Settings
- 14 C.F.R. § 91.151(a): Fuel Requirements for Flight in VFR Conditions

- 14 C.F.R. § 91.405(a), 91.407(a)(1), 91.409(a)(2); 91.417(a) and (b): Maintenance Inspections
- 14 CFR § 61.113 Private Pilot Privileges and Limitations

IX. CONCLUSION

Revolution UAS petition for exemption satisfies the criteria articulated in Section 333 of the Reform Act of 2012. The proposed UAS operations set forth in this petition not set precedent with previously approved exemptions. Approving this exemption, will benefit the public as a whole by improving safety, efficiency, cost and reducing the overall risk across a wide number of activities.

Thank for your consideration. If you have any questions or need additional information to support the requested exemptions, please do not hesitate to contact me at:

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