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

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

June 5, 2015

Exemption No. 11740
Regulatory Docket No. FAA–2015-0863

Mr. Joshua Lewis
President
Lewis Enterprises
191 Penny Lane
Le Roy, MN 55951

Dear Mr. Lewis:

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 26, 2016, you petitioned the Federal Aviation Administration (FAA) on behalf of Lewis Enterprises (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct precision photography for community and agriculture applications.

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. However, the FAA received five comments filed in the public docket supporting the petition.

Airworthiness Certification

The UAS proposed by the petitioner are the DJI Phantom 2 and DJI Phantom 2 Vision +.

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 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, Lewis Enterprises 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, Lewis Enterprises is hereafter referred to as the operator.

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

1. Operations authorized by this grant of exemption are limited to the DJI Phantom 2 and DJI Phantom 2 Vision + 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 June 30, 2017, unless sooner superseded or rescinded.

Sincerely,

John S. Duncan
Director, Flight Standards Service

Enclosures

Joshua Lewis, President
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Date: March 26, 2015

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

Re: Exemption Request under Section 333

Dear Madam or Sir,

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the "Reform Act") and 14 C.F.R. Part 11, Lewis Enterprises, seeks an exemption from the Federal Aviation Regulations ("FARs") listed below:

14 C.F.R. Part 21
14 C.F.R. 45.23
14 C.F.R. 45.29
14 C.F.R. 61.23
14 C.F.R. 61.3
14 C.F.R. 61.113(a) & (b)
14 C.F.R. 61.133(a)
14 C.F.R. 91.7(a)
14 C.F.R. 91.9
14 C.F.R. 91.109(a)
14 C.F.R. 91.119
14 C.F.R. 91.121
14 C.F.R. 91.151(a)
14 C.F.R. 91.203
14 CFR Subpart E (91.401 - 91.417)

The requested exemption would authorize unmanned aircraft operations using the DJI Phantom 2 for commercial precision photography for community and agriculture applications by Lewis Enterprises, in the United States. These operations will be subject to strict operating requirements and conditions defined by the safety code of the Academy of Model Aeronautics (see Appendix A). The requested exemption would permit Lewis Enterprises to operate their DJI Phantom 2, which weigh less than 5 lbs., for commercial Photography in support of the local farming community. The DJI Phantom 2 with onboard cameras to capture a high quality digital image

that works with a program called PIX4D along with the permission of the landowner will digitally map the surveyed area. Use of the DJI Phantom 2 for aerial surveys reduces the need to operate conventional aircraft for the same purpose and provides very high quality imagery at a fraction of the cost. These savings result in enhanced efficiency and productivity for the affected activities, as well as environmental benefits.

DJI Phantom Pilot training guide will be adopted by Lewis Enterprises operator safety program. (Appendix B) Operations under the exemption will be subject to strict operating requirements and conditions. This will ensure at least an equivalent level of safety to currently authorized flight operations using manned aircraft and under conditions as may be modified by the FAA as required by Section 333.

As described more fully below, the requested exemption would authorize commercial operations of aerial surveys using the DJI Phantom 2. The DJI Phantom 2 is small in size at 2.7 lbs. The DJI Phantom 2 will be operated under controlled conditions at low altitude in airspace that is limited in scope. As described more fully herein; it will have automated control features, as described below. The DJI Phantom 2 also will be operated by an individual from Lewis Enterprises that will be surveying 5 acre blocks at a time well within FAA's requirements. Lewis Enterprises will be offering their surveys as a service to the community. Finally, the airspace in which the Unmanned Aerial System (UAS), will operate and disclosed area of operation to the FAA in advance.

Lewis Enterprises respectfully submits this small, unmanned aerial vehicle because it will be used in lieu of comparatively hazardous operations. Operations currently conducted are with fixed wing and rotary conventional aircraft. The FAA can have confidence that the operations will achieve at least an equivalent level or greater level of safety. Approval of this exemption would thereby enhance safety and fulfill the Secretary of Transportation's (the FAA Administrator's) responsibilities under Section 333(c) of the Reform Act to "establish requirements for the safe operation of such aircraft systems in the national airspace system." The nearest airport to Le Roy is Fillmore County Airport at 20.28 miles from area of operation at its closest point.

As a local business, that is rooted in their community, Lewis Enterprises *promises to provide innovative products and dependable service to help its Community exceed their potential.* Unmanned aerial technology is becoming a desirable tool in the agricultural industry. As growers are caring for more and more acres, field scouting by foot is becoming less efficient. It is nearly impossible, nor practical, for a person to scout an entire field by walking. Aerial scouting technology allows a farmer to see a large field all at once. This allows for more efficient and effective recommendations and decision-making. The unmanned aspect of aerial technology eliminates the endangerment of human life by low and slow flight and allows a safe and cost-effective acquisition of close-up aerial images. Farmers in this area are aware of FAA's Rules and have asked Lewis Enterprises to acquire a section 333 exemption to comply with current mandate.

Given the technical specifications of the light weight DJI Phantom 2 especially, the type of operations, including flights above crops. Lewis Enterprises believes it is relevant to use the

Academy of Model Aeronautics (AMA) rules to meet the required level of safety in future operations with the DJI Phantom 2. Indeed, the AMA has a proven track record in terms of providing safety guidelines for operators using ultra-light remote controlled aircrafts.
Under this exemption, the operator would agree, if requested, to contact the FAA in order to provide the FAA with the details of the related missions and provide assurance that training and maintenance requirements are being met.

1. CHARACTERISTICS OF THE AIRCRAFT

The built-in flight control system is used to control the entire aircraft's functions in flight. Such as, Pitch (forwards and backwards), Roll (left and right), Elevator (up and down) and Yaw (turn left or right). The flight controller contains the MC (Main Controller), IMU (Inertial Measurement Unit), GPS (Global Position System), compass, receiver and LED (Light Emitting Diode) indicators. The IMU has a built-in sensor and a barometric altimeter that measures both attitude and altitude. The compass reads geomagnetic information which assists the GPS (Global Position System) to accurately calculate the aircrafts position and height in order to lock the aircraft in a stable hover. The receiver is used to communicate with the remote controller and the MC acts as the brains of the complete flight control system connecting and controlling all the modules together. See DJI Phantom 2 Manual (Appendix C)

2. PIX4D application used with DJI Phantom 2.

Once the entire field is flown, images collected can be "stitched" together in a software program to make a complete infrared or multispectral map of a field. Using specific mathematical equations within the Pix4D program, different crop stresses and production factors can be discovered. Here are a few examples:
Nutrient deficiencies
Weed pressure and type
Presence and onset of disease
Insect presence and pressure
Weather damage (hail/wind)
Soil erosion
Tile line mapping
Plant population counts/estimates
Yield estimates
Soil types
Location of escaped livestock

Often, diseases or insects begin deteriorating plant health within one part of a field and spread over time. If a farmer is only able to see a few areas of a field, the chances of overlooking a major problem are incredibly high, but if the entire field can be photographed, plant health issues can be fixed before they expand, reducing yield loss. By using *real-time* aerial imagery to see the onset and occurrence of plant stresses, Lewis Enterprises can better help their community maintain a high yield (more production), and in turn, high profitability, in a safe and efficient manner.

Overall, UAS technology offers a substantial economic benefit to the agricultural industry. The DJI Phantom 2 would save Farmers a lot of time scouting fields and give them more facts on how to better manage their fields. Not only will time be saved, but fuel cost from driving around fields, as everything can be scouted from one spot. Because the DJI Phantom 2 and PIX4D images are geo-referenced, Farmers can pinpoint a problem area on a map and then walk or drive directly to that area to see what issues are happening and potentially correct them.

3. Operating Conditions

Granting an exemption to Lewis Enterprises for use of the DJI Phantom 2 will be subject to the following operating conditions, set forth by the Academy of Model Aeronautics (see Appendix A). The main restrictions are summarized below:

-Operations are to be conducted over private and controlled-access.
-Permission from the landowner/authority required before commencing any flight.
-Operations over congested areas shall be avoided;
-Operations must not interfere with manned aircraft operations, must yield the right of way to manned aircraft, and operators must See & Avoid other aircraft and obstacles at all times.
-Operations limited to Visual Flight Rules Meteorological Conditions (VFRMC) and daylight hours.
-Aircraft operations must remain within Visual Line of Sight (VLOS) and will be visually monitored at all times; Visual Line of Sight operations guaranteed with a GPS geo-fence around operator of 0.19 miles.
-Flight ceiling pre-programed at 200 feet;
-All operations conducted within 5 miles from an airport shall only be initiated after verbal coordination with the airport authority, or air traffic control when a control tower is present at the airport.
-All operations shall comply with required permissions and permits established by territorial, state, county or city jurisdictions; including local law enforcement, fire, or other appropriate governmental agencies.
-The DJI Phantom 2 operations will be compliant with existing safety procedures inherent to the activities of the related company.

A large percentage of the land serviced by Lewis Enterprises is in isolated, rural, nonresidential areas. Before a field is flown, Lewis Enterprise will request written permission from each grower. Residents within the vicinity of each field will also be notified of a flight and educated on the fact that Lewis Enterprise is simply scouting crop fields by air. With the geo-fence incorporated within the software, Lewis Enterprise will avoid flying over residential houses and adjacent yards as much as reasonably possible. The flight ceiling will be pre-programmed at 200 feet so as to ensure the aircraft will not fly over the height specified by the FAA. By staying below this level, the DJI Phantom 2 should not interfere with manned aircraft operations

Lewis Enterprise takes pride in providing a safe working environment for its Community and will maintain a high safety level For UAS to be integrated into America's air space. Lewis Enterprise wants to set a good example for the community which it resides in and be a local resource for information on UAS and its growing technology.
See Appendix D for map of Area of Operation.

4. Operator Requirements

The DJI Phantom 2 is a light weight UAS platform made of Plastic body with no sharp or hard edges characterized by a high level of pre-programmed controls and various built-in technical capabilities (programming of a geo-fence and height limitations) that prevent the operator from doing a mission outside of the operating limits. All flights are Pre-programmed with DJI Ground station App, 6 satellites are needed to initiate take off with GPS guidance and do not require human intervention; nevertheless human override is possible by clicking one of the multiple "action" buttons or by using the remote controller provided with each DJI system. In the case of unplanned events either the autopilot reacts immediately, or the operator can choose between different pre-programmed or manual actions. Those procedures include a Flight Termination System (emergency landing procedure, triggered by the autopilot or the operator in charge: given its very light weight, the DJI Phantom 2 will initiate auto land sequence).

4. CONCLUSION

The value that the DJI Phantom 2 could bring to the agricultural industry is invaluable. It would bring several efficiency and production benefits to farming operations. This will allow Lewis Enterprise to provide the local community and farmers with outstanding service in order to help them exceed their potential. If the population is expected to continually increase, then it is essential for agricultural production to escalate as well. Allowing Lewis Enterprise to utilize the DJI Phantom 2 in their operations in a safe manner in accordance with AMA and FAA guidelines would not only make sense economically, but would also help with the sustainability of agricultural crops.

Sincerely,

Joshua Lewis, President.