



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

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

August 17, 2015

Exemption No. 12480
Regulatory Docket No. FAA-2015-0998

Mr. Charles Ayers
6680 Mossy Glen Drive
Fort Myers, FL 33908

Dear Mr. Ayers:

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 one letter posted to the public docket on April 14 and one dated June 21, 2015, you petitioned the Federal Aviation Administration (FAA) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial photography, inspections and 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 is a DJI Phantom 2 Vision+.

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 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 collection¹. 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, Mr. Charles Ayers 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, Mr. Charles Ayers is hereafter referred to as the operator.

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

1. Operations authorized by this grant of exemption are limited to the DJI Phantom 2 Vision+ when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.
2. Operations for the purpose of closed-set motion picture and television filming are not permitted.
3. The UA may not be operated at a speed exceeding 87 knots (100 miles per hour). The exemption holder may use either groundspeed or calibrated airspeed to determine compliance with the 87 knot speed restriction. In no case will the UA be operated at airspeeds greater than the maximum UA operating airspeed recommended by the aircraft manufacturer.
4. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL). Altitude must be reported in feet AGL.
5. The UA must be operated within visual line of sight (VLOS) of the PIC at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license.
6. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the duties required of the VO.
7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The operating documents must be accessible during UAS operations and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents, the conditions and limitations herein take precedence and must be followed.

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

8. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics, e.g., replacement of a flight critical component, must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.
9. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.
10. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the UAS is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, e.g., inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.
11. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the aircraft and aircraft components.
12. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.
13. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.
14. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be

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

15. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.
16. The UA may not operate within 5 nautical miles of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD) or for airports not denoted with an ARP, the center of the airport symbol as denoted on the current FAA-published aeronautical chart, unless a letter of agreement with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.
17. The UA may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.
18. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the private or controlled-access property.
19. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.
20. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UA to conduct the intended operation and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater.
21. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.
22. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification

(N–Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.

23. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under 14 CFR §§ 91.9 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.
24. The UA must remain clear and give way to all manned aviation operations and activities at all times.
25. The UAS may not be operated by the PIC from any moving device or vehicle.
26. All Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:
 - a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner ensuring the safety of nonparticipating persons; and
 - b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

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

27. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.
28. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS–80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.nts.gov.

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 August 31, 2017, unless sooner superseded or rescinded.

Sincerely,

/s/

John S. Duncan

Director, Flight Standards Service

Enclosures

My name is Charles Ayers and I would like to petition for an exemption under Section 333. I would like to use a multi-roter quadcopter aerial drone (DJI Phantom Vision+) for commercial purposes. The quadcopter is fitted with a camera that will capture images for real-estate, marketing and roof inspections. It will be flown within FAA guidelines for use.

The Phantom 2 Vision + quadcopter uses wireless communication with the controller transmitter operating in the 5.8Ghz frequency band. It is compliant with CE (300m) and FCC (500m) regulations and effective ranges. If it flies beyond the effective range it will enter and failsafe mode and return home.

Max height and radius have been set in the unit's software as well as no-fly zones and restricted-altitude areas. The software alerts the operator when near these areas and issues a warning when flying near the zone. If it enters a no-fly zone it automatically lands. If trying to take-off in a prohibited area the motors will not start.

The quadcopter will be flown in residential areas and on personal property as permitted by the land or home owner. Safety procedures will be in effect including a maximum height of 200 feet for flight and a maximum speed of under 10m/s. In addition, propeller guards will be used when flying in proximity to people. The unit will be in direct line of sight of the operator at all times. It will also be flown in winds under 15mph to minimize risk of crashing.

Pre-flight safety check includes examining battery, propellers, calibrating the compass and the unit's shell for damage and that the self-tightening propellers are secured. The quadcopter will not be flown in inclement weather including heavy wind and rain. Obstacles such as trees, powerlines and buildings will also be avoided. Regular maintenance will be performed as required for the motors and internal circuitry. Propellers will be changed for new ones if chipped or damaged in any way. Screws on the unit's shell will be inspected frequently for signs of loosening.

The weight of the craft is 1160g which is well below the maximum weighted payload of 1350g. Max speed is 15m/s. My proposed speed will be much lower than this as I'm only concerned with capturing images of homes and property. The operating frequency of the controller's wireless range extender is 2412MHz-2462MHz and the open area communication distance is 300m.

I, Charles Ayers, will be the only operator using the quadcopter under this exemption and am directly responsible for the proposed operation. I have become completely versed in operating this device from several months of personal use.

June 21, 2015

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

Exemption Request Section 333 of the FAA Reform Act of 2012

Attachments:

- 1) Phantom 2 Vision+ User Manual V1.04
- 2) Phantom 2 Vision Plus Quick Start Guide
- 3) Phantom 2 Vision Pilot Training Guide
- 4) Phantom 2 Vision Release Notes

References:

- 1) FAA Exemption No. 11138, Regulatory Docket No. FAA20140481 in the matter of the petition of DOUGLAS TRUDEAU
- 2) FAA Exemption No. 11136, Regulatory Docket No. FAA-2014-0508 in the matter of the petition of ADVANCED AVIATION SOLUTIONS LLC
- 3) FAA Exemption No. 11080 Regulatory Docket No. FAA20140355 in the matter of the petition of FLYING CAM INC

Dear FAA,

In accordance with the FAA's **Guidelines for Submitting a Petition for Exemption under section 333 of the FAA Modernization and Reform Act of 2012**, I, Charles Ayers, request exemption from the following sections of Title 14, Code of Federal Regulations §§

61.113(a). 61.113(b). 91.119(c). 91.121. 91.151(a). 91.405(a). 91.407(a)(1). 91.409 (a)(1). 91.409(a)(2). 91.417(a) & (b).

In order to operate small unmanned aircraft systems (UAS) commercially in airspace regulated by the Federal Aviation Administration (FAA) for the purposes of aerial photography, structural inspections of bridges, pipelines, well and cell towers, real estate marketing and surveys and other flight operations that could

91.405(a). 91.407(a)(1). 91.409 (a)(1) & (2). 91.417(a) & (b) As discussed in Exemption 11138 (DOUGLAS TRUDEAU), I, Charles Ayers, propose to inspect and ensure that the UAS is in a condition for safe flight in accordance with the operating documents. The FAA found that adherence to the petitioner's operating documents and the conditions and limitations specified, describing the requirements for maintenance, inspection, and recordkeeping, were sufficient to ensure that safety would not be adversely affected.

The UAS

The DJI Phantom 2 vision plus is a highly successful consumer grade small rotorcraft in the quadcopter configuration with an advertised weight of less than 44 ounces (1242g) designed primarily to carry aloft a high definition camera. It has an advertised maximum speed of less than 30 knots (15m/s) and a maximum climb rate of less than 1200 feet per minute (6 m/s). It is powered by four electric motors with a distance between motors of less than 14 inches (350mm) It utilizes an internal inertial measuring unit (IMU) with integrated barometric sensor augmented with global positioning system (GPS) to maintain its geospatial orientation and position. It is controlled primarily through an FCC certified radio control (RC) unit. Real time video and telemetry information is transmitted back to a ground control station allowing the operator and/or PIC to monitor battery level, GPS signal strength, altitude (AGL), distance from PIC, camera imagery, and control camera angle. It has fail safe modes of operation for either loss of RC or GPS signal. Altitude can be limited by the onboard flight controller and maximum altitude can be preprogrammed by the PIC. Battery life limits flight times to approximately 25 minutes. The onboard flight controller will warn the pilot via telemetry and external lighting cues before reaching a low battery state. An automatic termination of flight and landing will be initiated when the battery reaches a predetermined low state. It is anticipated that flights will usually last less than 10 minutes. More information is available in attachment 1.

Risk mitigation

I, Charles Ayers, have reviewed FAA exemptions reference's 13 **Conditions and Limitations** section and believe that the procedures specified therein are reasonable and will be utilized in order to manage and mitigate risk and ensure public safety.

A preflight checklist will be developed and employed to ensure that the UAS's airworthiness will be verified before launch. Airworthiness will be maintained by performance of routine inspections before each flight, maintaining flight and maintenance logs to record time on failure prone components.

I, Charles Ayers, state that operation will not occur within 5 miles of an airport or any unauthorized space.

"The UA may not operate in Class B, C, or D airspace without written approval from the FAA. The UA may not operate within 5 nautical miles of the geographic center of a non towered airport 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 operator's COA. The letter of agreement with the airport management must be made available to the Administrator upon request."

Public interest

Use of the UAS in lieu of a manned aircraft would enhance safety and reduce the environmental impact as compared to similar operations conducted with manned aircraft of greater proportions, carrying a crew and flammable fuel.

In regards to performing inspections of bridges, towers, and natural gas pipelines the UAS will minimize the risk to persons attempting to climb these structures and photograph problem areas. It will provide a way for companies to have their engineers review photographs and provide additional safety to the general public in regards to towers failing or natural gas pipelines having structural issues. Many of the natural gas pipelines in our area travel in areas that are hard to reach by vehicle or foot and if an area is suspected of having problems the UAS can reach it to make an assessment easier and safer.

I, Charles Ayers, will also make the UAS and myself available to local volunteer organizations (for no charge) such as fire departments, local law enforcement, etc., to perform search and rescue operations, or other similar events as directed by authorities.

In addition the use of the UAS in order to facilitate commerce could lead to economic growth. Operations for this petition will enable service for property owners or their designees seeking an enhanced perspective for characteristics, amenities, and benefits of their desired photographic subjects that cannot be displayed through ground level photography. Aerial photography is a valuable

marketing tool that can lead to increased commerce and enhance my personal photography. A visual observer will be utilized at all times that the UAS is performing duties for compensation.

My own research shows an upward demand for these services that currently exists in the real estate market, surveying and other markets are just beginning to realize the need for such services.

Flight data including UAS flight time, Control Unit operation time, incident, and details will be recorded for each flight and made available to the FAA at any time needed.

Any deviations from normal operations will also be recorded and made available to FAA.

Conclusion

I, Charles Ayers, am requesting this exemption for the purposes of aerial photography of real estate, bridge inspections, land surveying, tower inspections, and other flight operations.

The reason for such a general and broad based request is that I, Charles Ayers, wish to utilize a business strategy in order to capitalize on opportunities as they may arise in the future without the long turnaround time associated with additional exemptions.

My business model is based on the idea of offering small UAS services to individuals or companies who wish to employ these services as a safe, effective, and legal option to enhance their business or prevent structural disasters that may influence the general public or individuals.

be performed safely and more cost effectively with the use of small UAS at low altitude within the U.S. national airspace system as compared to a manned aircraft. Operations will be performed only at the request of and with the authorization and permission of clients or their authorized agents in order to facilitate commerce and raise awareness of the beneficial uses of small unmanned air systems. So long as such operations are conducted within and under the conditions outlined herein or as may be established by the FAA as required by Section 333. The conditions identified and proposed by, Charles Ayers, are drawn from references 13.

91.119(c) As discussed in Exemption 11138 (DOUGLAS TRUDEAU), operations conducted closer than 500 feet to the ground may require that the UA be operated closer than 500 feet to essential persons, or objects that would not be possible without additional relief. The petitioner requests modification, waiver or exemption and clarification concerning the terms "congested areas" and "densely populated". I, Charles Ayers, request waiver for this condition to allow reasonable and responsible operations with safety as my main concern in areas of subdivisions and neighborhoods if required.

91.121 As discussed in Exemption 11138 (DOUGLAS TRUDEAU) is inapplicable since the UAS does not have an altimeter and instead utilizes electronic GPS with a barometric sensor for altitude information.

91.151(a) As discussed in Exemption 11136 (ADVANCED AVIATION SOLUTIONS LLC) prior relief has been granted for manned aircraft to operate at less than the prescribed minimums, including Exemption Nos. 2689, 5745, and 10650. In addition, similar UAS specific relief has been granted in Exemption Nos. 8811, 10808, and 10673 for daytime, VFR conditions. The UAS provides battery power remaining in percent to the PIC. The UA batteries provide approximately 25 minutes of powered flight. Information provided in the operating documents discusses procedures regarding remaining battery power management. Those documents contain a condition in which the PIC will initiate a landing procedure when battery remaining reaches a specified level. Given the limitations on proposed operations and the location of those proposed operations, The FAA found that a reduced minimum power reserve for flight in daytime VFR conditions was reasonable.