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

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

September 2, 2015

Exemption No. 12732
Regulatory Docket No. FAA−2015−1831

Mr. Ed Wilke
Lockheed Martin
16020 Empire Grade Road
Santa Cruz, CA 95060

Dear Mr. Wilke:

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 posted to the public docket on May 20, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Lockheed Martin (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial target flights to develop a reliable tracking system.

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.

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, Lockheed Martin 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.

Conditions and Limitations

In this grant of exemption, Lockheed Martin is hereafter referred to as the operator.

[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.

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 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

Sir,

Lockheed Martin would like to operate a Phantom II quad copter in order to provide an aerial target to develop a reliable tracking system for our ADAM/ATHENA system. The Athena system is being developed to Track, ID and protect against Class II and Class I UAS's, small rockets, small boats and mortars. Please contact us for further clarification if needed.

1) Regarding the Unmanned aircraft

a. The DJI Phantom II will be the UAS utilized. It is a Quad Copter equipped with four rotors that are driven by electric motors powered by a battery, and controlled by a transportable ground station provided by the manufacturer DJI. The Phantom II has a max air speed of 30 knots and weighs less than 1300 grams. Its size is 20"x20" x 8" .Attached is the manufacturer's operation and maintenance manual, which lists the flight capabilities and operational features of the aircraft. The system has several safety features:

1) If the signal from the transmitter/control box is lost, the Phantom automatically goes into a "Return to Point of Origin" mode, and returns to its initialization point and lands.

2) It also goes into the auto "Return to Point of Origin" mode if the battery reaches 15% level of charge left.

3) Allowable Distance from the " Point of Origin" can be programmed to limit the UAS's range.

b. The radio frequency complies with the FCC requirements, as per the manufacturer's documentation that accompanies each aircraft, and is noted in the manufacturer's operation and maintenance manual.

2) Regarding the operation of the UAV.

a. All operations will be on the Lockheed Martin Santa Cruz, Ca. Test Facility, a remote site in the Santa Cruz mountains that is approx. 4 miles n/s and 2 miles e/w. See attached Google map.

b. Before operations, LM Environmental Safety and Health representatives will review and confirm that any issued Fire warnings, weather or other safety conditions are met in order for flights to occur. This includes fog, high winds and low cloud ceilings. A base wide notification will be issued to alert all base personnel that flight operations will be conducted and that the flight area is a restricted access area.

c. All flights will have a Pilot in Control (PIC) and at least one Aircraft Observer/Spotter. They will remain within normal talking volume distance of each other and each have walkie talkies that do not interfere with the quad copter control signals for communication with the tracking station. There will also be at least one base radio available at their location in the case of an emergency. The Aircraft Spotter is to watch for other aircraft and assist in maintaining visual contact on the quad copter and to stay in constant verbal contact with the PIC. The PIC will have a minimum of 2 hours of time on a RC copter Flight simulator before flying the UA , have 5 hours of documented flight time with the Phantom in sessions specifically for training flight , be an AMA member and follow the AMA Flight Safety code (see attached AMA safety code).

d. A preflight check will be performed and noted in the Flight Log Book (see attached log sheet). All discrepancies must be resolved and noted as such in the Flight Log Book before the aircraft can be flown.

e. All flights will be during day light hours only, and the aircraft must remain in visual sight at all times.

f. The UAV will not be operated near any buildings, power lines, elevated lights or groups of people.

g. The Phantom II has an altitude limit of 400 ft. AGL due to the manufacturer's programming parameters and cannot be exceeded. Flights authorized under the new 333 rules state that an altitude ceiling of 200 feet is to be observed at all times. Flights will be restricted to this height by changing the software height parameter to 200 feet to ensure compliance.

g. Flight operations will typically be directly over logging access roads and logging clearings. Access to these roads is restricted by access gates that are locked at all times and are under the direct control of Lockheed Martin.

.h. The typical flight path will originate approx. one mile from the boundary line of LM Property and will follow the "Center Ridge Road" (see google Earth map) for approx. 1000 yards in one direction, then reverse course, return to launch location and continue on above the road for 1000 yards. Requests for alterations in course and altitude will be received from the tracking site and performed as long as there no safety or distance issues. A GPS tracking device (Garmin Dog Collar) will be attached to the quad copter in the event of the aircraft going down.

1) The co-ordinates for #1 are 37 degrees 06'32.36" N 122 degrees 12'29.99" W elev 1593
2) The co-ordinates for #2 are 37degrees 06' 16.36" N 122 degrees 12' 37.67" W Elev 1514
3) The flight area will be a radius of 3000 feet from either of these two launch points.
4) Launch site # 1 has a better angle for a sky background.
5) Launch site #2 has a better launch/landing area.

i. After a maximum 15 minutes of flight, the quad copter will return to launch point so as to not drain the battery too low and cause the "Auto Land "function to activate.

j. The LM Santa Cruz Test Base is not near any airports. It is approx. 23 miles from San Jose Airport and 27 miles from Watsonville airport, the two nearest airports.

k. Lockheed has a Certificate of Waiver or Authorization (COA) to launch Class 2 rockets at the Santa Cruz Test Base, and calls in to NCT traffic management, as well as requesting a NOTAM prior to model rocket operations. We would perform the same notification process prior to UAV operations in order to continue having a safe airspace during UAV operations.

Exemptions requested:

14 CFR part 21, Subpart H (Airworthy Certificates) and 91.203(a) and (b) (Certifications required) - due to the size, weight, speed, and limited operating area that the aircraft is be used in, an exemption for these items is warranted and meets the requirements for the equivalent level of safety under 14 CFR part 11 and Section 333 of P.L. 112-95 (section 333).

45.23 *Marking of the aircraft* – the UAV does not have a cabin, cockpit or pilot station on which to mark words or phrases. Two inch letters are difficult to place on an aircraft with dimensions smaller than the minimal lettering requirement. However, we will mark with the largest possible lettering the word "LOCKHEED" on the fuselage as required by 45.29(f) so that the PIC and the Spotter will see the markings.

91.405(a), 91.407(a) (1), 91.409(a) (2) and 91.417(a) and (b) *Maintenance inspections* as they apply only to aircraft with an airworthiness certificate. As a safety precaution, a preflight inspection of the UA will be performed before each flight as outlined in the operating document.

61.113(a) and (b) - private pilots are limited to non-commercial operations, however an equivalent level of safety can be achieved by current regulations as the UAV does not carry any pilots or passengers. In addition, while a pilot license is helpful, it does not ensure remote piloting skills. The risk of operating a UAV are much less than the risk levels of operating a manned aircraft engaged in commercial activities as outlined in 14 CFR part 61. As such an exemption from 61.113 *Private Pilot Privileges and Limitations: Pilot in Command* is requested.

91.7(b) (a) prohibits the operation of an aircraft without an airworthiness certificate. Since there is no certificate applicable to this aircraft, it is requested that this regulation be exempted.

91.9(b) (2) requires an aircraft flight manual in the aircraft. As there are no pilots or passengers on board this aircraft, and due to the Phantom's size, an exemption is requested. Having the safety/flight manual on the ground with the UAS ground Station where the PIC is located is a more effective location.

91.*121 altimeter settings* are not applicable as the Phantom uses electronic GPS with a barometric sensor.

91.151(a) *Fuel requirements for flight in VFR conditions* – the Phantom does not have any liquid fuel. It is powered by a battery, so this requirement is not applicable.