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

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

September 17, 2015

Exemption No. 12887
Regulatory Docket No. FAA−2015−2708

Ms. Rebecca Frost
On Top of It
2 Elliott Farm Road
Tewksbury Township, NJ 07830

Dear Ms. Frost:

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 letters posted to the public docket on July 2 and August 27, 2015, you petitioned the Federal Aviation Administration (FAA) for an exemption. You requested to operate an unmanned aircraft system (UAS) to conduct aerial photography.

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 3 Professional.

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, Ms. Rebecca Frost 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, Ms. Rebecca Frost 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 3 Professional 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

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Rebecca Frost - Exemption/Rulemaking

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Content

I am petitioning for an exemption to Section 333 in order to begin a business to take aerial photographs and videos of homes in my rural area of New Jersey to assist the real estate agent.

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Document Information

Date Posted:
Jul 2, 2015

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Submitter Information

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Comments

0
Comments Received *

Docket Information

This document is contained in
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Related Dockets:
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Related RINs:

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August 1, 2015

Brenda Robeson Program Analyst, Airmen and Airspace Rules Division
U. S. Department of Transportation
Federal Aviation Administration
800 Independence Ave S.W
Washington, DC 20591

Re: Exemption Request Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations

Dear Ms. Robeson:

Thank you for your detailed letter dated July 27 carefully explaining why my petition for exemption could not be processed. I hope that the details here adequately address your questions. In short, I have a DJI Phantom 3 Pro and I want to take photo for local realtors in our rural community. This application is for small Unmanned Aerial Systems (UAS).

Following is a summary of **your questions** and provided my responses.

The specific section or sections of 14 CFR from which you seek relief, the extent of the relief you seek, and the reason you seek relief.

SECTION 333 EXEMPTION REQUEST LIST

Following is a summary of the exemption application to allow commercial operation of small aerial vehicles for aerial real estate photography. An exemption is requested from the following regulations:

14 C.F.R. Part 21;
14 C.F.R. 45.23(b);
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(b)(2) & (c);
14 C.F.R. 91.103;
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(a) & (b);
14 C.F.R. 91.405(a);
14 C.F.R. 91.407(a)(1);
14 C.F.R. 91.409(a)(2);
14 C.F.R. 91.417(a).

If you find any of the requested exemption not applicable to my small drone or the intended use an exemption to a partial list of the above would be greatly appreciated. Most important are the bold ones above: **14 CFR § 61.113(a) & (b); 61.133(a)**

The reasons why granting the request would be in the public interest; that is, how it would benefit the public as a whole.

On Top Of It shares Congress's goal of getting small aerial vehicles (a.k.a., drones) flying commercially in the United States safely and soon. In the FAA Modernization and Reform Act of 2012, Congress directed the FAA "to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system" and, under Section 333 of that law, gave the FAA power to grant innovators "expedited operational authorization" to do so. By this petition, Rebecca Frost, of *On Top Of It* is seeking its first such authorization, in order to safely advance commercial photography applications.

Specifically, in my case, I plan to offer very inexpensive aerial photos of real estate properties to facilitate home sales and commercial real estate properties. Although Google-Earth shows aerial views of certain features, the photos are very old and are not at adequate resolution to see fine details of landscapes, unsafe structures, or shadowed views. This is also extremely important in residential real estate when considering home purchasers who are relocating and cannot visit the home they purchase directly.

It is also in the public interest to facilitate commerce and entrepreneurialism.

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

A detailed discussion of each rule is provided in the appendix. However, in short, except for selling my photos, all request exemptions are consistent with those allowed for hobbyist use. We will stay fully compliant with all rules of hobbyists.

Any additional information, views, or arguments available to support your request

Please see the appendix.

Please feel free to email me directly if you need further information.

Thank you for your consideration and prompt attention.

Respectfully submitted,

Rebecca Frost
908.268.7284 | r.frost107@gmail.com
On Top Of It
2 Elliott Farm Road
Tewksbury Township, NJ 07830

Appendix

EXEMPTION REQUESTS AND EQUIVALENT LEVEL OF SAFETY

The applicant requests an exemption from the following regulations as well as any additional regulations that may technically apply to the operation of small aerial vehicles:

14 CFR Part 21, Subpart H: Airworthiness Certificates
14 CFR § 91.203(a)(1)
Section 91.203(a)(1) requires all civil aircraft to have a certificate of airworthiness. Part 21, 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 of the aircraft (typically less than 5 lbs., and always less than 55 lbs.) and the limited operating area associated with its utilization, it is unnecessary to go through the certificate of airworthiness process under Part 21 Subpart H to achieve or exceed current safety levels.

Such an exemption meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the Reform Act. The Federal Aviation Act 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 UAS involved.

In this case, an analysis of these criteria demonstrates that the UAS operated without an airworthiness certificate, under the conditions proposed herein, will be at least as safe, or safer, than a conventional aircraft (fixed wing or rotorcraft) with an airworthiness certificate. The UAS weighs typically less than 5 lbs., and always less than 55 lbs. fully loaded. It will not carry a pilot or passenger, will not carry flammable fuel, and will operate exclusively within an area pre-disclosed and in compliance with conditions set forth herein. Operations under this exemption will be tightly controlled and monitored by the operator, pursuant to the conditions set forth above. Receipt of the permission of the land owner or authorized agent, the size of the aircraft, the lack of flammable fuel, and the fact that the aircraft is carried to the location and not flown there all establish the equivalent level of safety. The UAS provides at least an equivalent, and most likely exceeds, level of safety to that of such operations being conducted with conventional aircraft that would be orders-of-magnitude larger and would be carrying passengers, cargo, and flammable fuel.

14 CFR. § 45.23 & 91.9(c): Marking of the Aircraft
Regulation 45.23 provides:
(a) Each operator of an aircraft must display on that aircraft marks consisting of the Roman capital letter "N" (denoting United States registration) followed by the registration number of the aircraft. Each suffix letter used in the marks displayed must also be a Roman capital letter.
(b) 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.

Regulation 91.9(c) provides:
No person may operate a U.S.-registered civil aircraft unless that aircraft is identified in accordance with part 45 of this chapter.

The UAS has no entrance to the cabin, cockpit, or pilot station on which the markings can be placed. Given the size of the UAS, two-inch lettering will be impossible. Official marking systems for UAS have not yet been established for operations inside the NAS.

The FAA has issued the following exemptions to this regulation; see *Exemption Nos. 8738, 10167, 10167A and 10700.*

14 CFR § 61.113(a) & (b); 61.133(a): Private Pilot Privileges and Limitations; Pilot in Command; Commercial Pilot Privileges and Limitations.
Section 61.113(a) & (b) limit private pilots to non-commercial operations. Unlike a conventional aircraft that carries a pilot, passengers, and cargo, the UAS in this case is remotely controlled with no passengers or property of others on board. Section 61.133(a) requires an individual with a commercial pilot’s license to be pilot in command of an aircraft for compensation or hire. The applicant respectfully proposes that operator requirements should take into account the characteristics of the particular UAS. Most UAS autopilot’s have a high degree of pre-programmed control and various built-in technical capabilities that strictly limit the potential for operation outside of the operating conditions set forth in the exemption application. Hands-on experience with the UAS are a far more effective guarantee of flight safety than a commercial pilot certificate would be, until the FAA Pilot Certificate requirements catch up to the UAS technology.

The UAS autopilots have an all-digital software platform with advanced features previously restricted to full size unmanned aircraft. Automated features and advanced fly-safe controls enable safe, reliable operation, as well as advanced networking capabilities and system extensibility.

- The system can autonomously fly a programmed flight path or fly in manual mode
- Flight time and battery minutes are displayed at all times. The system will return home and land automatically if user-configurable limits are reached.

Flight safety is a priority, no matter the operating environment or project. UAS offer superior safety over manned aircraft by removing the need for people to be onboard in potentially dangerous situations. With multiple built-in safety features, UAS platforms lead manned operations with respect to safety.

- The UAS automatically detects potential issues - with configurable automated response behavior such as a return-home-and-land routine
- The UAS self-calibrate all of their sensors and perform required failsafe pre-flight tests prior to takeoff to check for errors
- The UAS have the ability to set up visual no-fly zones or create a virtual fence so the UAS can’t fly vertically beyond the pre-planned flight height

- The UAS have battery minutes and flight time displayed at all times. The system will return home and land automatically if user-configurable limits are reached
- The UAS auto detect a lost GPS, warns the pilot and initiates an immediate landing.
- Low battery on the UAS triggers a Non- Fatal Warning alarm to return home, land and replace the battery
- If UAS detect a lost-link to the Ground Station the vehicle will perform its pre-defined Non-Fatal Condition Response.

Given these safety features, the applicant proposes that operators of UAS with these features should not be required to hold a commercial or private pilot certification.

The risks associated with the operation of the UAS (given its size, speed, operational capabilities, and lack of combustible fuel) are so diminished from the level of risk associated with private pilot operations or commercial operations contemplated by Part 61 with conventional aircraft (fixed wing or rotorcraft), that allowing operations of the UAS as set forth above meets or exceeds the present level of safety provided under 14 C.F.R. § 61.113(a) & (b) and does not rise to the level of requiring a commercial pilot to operate the aircraft under § 61.133(a).

14 CFR § 91.7(a): Civil aircraft airworthiness.
This regulation requires that no person may operate a civil aircraft unless it is in airworthy condition. Should the exemption be granted allowing commercial operation of UAS without an airworthiness certificate, no standard will exist for airworthiness of the UAS. Given the size of the UAS and the previous COAs issued for similar UAS, an equivalent level of safety will be achieved by ensuring compliance with the given UAS manuals and use of safety checklists prior to each flight.

14 CFR § 91.9(b)(2): Civil Aircraft Flight Manual in the Aircraft.
The regulation provides:
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 the size of UAS, they have no ability or place to carry such a flight manual on the aircraft, not only because there is no pilot on board, but because there is no room or capacity to carry such an item on the aircraft.

The equivalent level of safety will be achieved by keeping the flight manual at the ground control point where the pilot flying the UAS will have immediate access to it. The FAA has issued to others the following exemptions to this regulation: *Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 9565B, 10167, 10167A, 10602, 32827, and 10700.*

14 CFR § 91.103: Preflight action
This regulation requires each pilot in command to take certain actions before flight to insure the safety of flight. As FAA approved rotorcraft flight manuals will not be provided for the

aircraft an exemption will be needed. An equivalent level of safety will be provided by following a preflight checklist. The applicant will take all actions including reviewing weather, flight battery requirements, landing and takeoff distances and aircraft performance data before initiation of flight.

14 CFR § 91.119: Minimum Safe Altitudes

Section 91.119 establishes safe altitudes for operation of civil aircraft. Specifically, 91.119(c) limits aircraft flying over areas other than congested areas to an altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

Applicant will always fly below 400 feet.

The equivalent level of safety will be achieved given the size, weight, speed, and material with which UAS are built. Compared to aerial survey operations conducted with aircraft or rotorcraft weighing far more than 55 lbs. and carrying flammable fuel, any risk associated with these operations will be far less than those currently allowed with conventional aircraft operating at or below 500 feet AGL. Indeed, the low-altitude operations of the UAS will maintain separation between these UAS operations and the operations of conventional aircraft that must comply with Section 91.119.

14 CFR § 91.121: Altimeter Settings

Section 91.121 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. Some UAS have a barometric pressure sensor, while others only use GPS for elevation or altitude. When a barometric pressure sensor is on the UAS, it is typically "zeroed" at the point of take-off; this is right next to the pilot and not at a departure airport. The altitude reading will be relative to that point (on the ground) and not a known elevation.

The equivalent level of safety will be achieved by the pilot confirming the elevation or altitude of the launch site. The altitude of the UAS will also be displayed via telemetry on the Ground Station and will be constantly monitored by the pilot during the entire flight operation.

14 CFR § 91.151(a): Fuel Requirements for Flight in VFR Conditions

This regulation prohibits an individual from beginning "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."

The different UAS batteries provide a variety of powered flight times. An exemption from § 14 CFR 91.151 is therefore required.

The applicant believes that an exemption from 14 CFR § 91.151(a) is safe and within the scope of a prior exemption. *See Exemption 10673* (allowing Lockheed Martin Corporation to operate without compliance with 91.151(a)). Operating the UAS, without 30 minutes of reserve fuel does not engender the type of risks that Section 91.151(a) was meant to prevent given

the size and speed at which the UAS operates. The fact that it carries no pilot, passenger, or cargo also enhances its safety. In the unlikely event that the UAS should run out of fuel, it would simply land. Given its weight and construction material, the risks are less than contemplated by the current regulation.

The applicant believes that an equivalent level of safety can be achieved by maintaining 20% of reserve fuel (or battery), which would be more than adequate to return the UAS to its planned landing zone from anywhere in its operating area.

The FAA has granted similar exemptions to others, including *Exemptions 2689F, 5745, 10673 and 10808.*

14 CFR § 91.203 (a) & (b): Carrying Civil Aircraft Certification and Registration
This regulation provides as follows:

(a) … no person may operate a civil aircraft unless it has … 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.

The UAS fully loaded weigh typically less than 5 lbs., and always less than 55 lbs. As such, there is no ability or place to carry certification and registration documents or to display them on the UAS. In addition, there is no pilot on board the aircraft.

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.*

14 CFR § 91.405(a); 407(a)(1); 409(a)(2); 417(a): Maintenance Inspections
Section 91.405(a) requires that an aircraft operator or owner "shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter ..." Section 91.407 similarly makes reference to requirements in Part 43; Section 91.409(a)(2) requires an annual inspection for the issuance of an air worthiness certificate. Section 91.417(a) requires the owner or operator to keep records showing certain maintenance work that has been accomplished by certificated mechanics, under Part 43, or licensed pilots and records of approval of the aircraft for return to service.

The UAS are nearly maintenance free, they perform automatic pre-flight checks and the failure of any check will prevent take-off. Checks which cannot be done by the system will be performed by a qualified person prior to each flight and at predefined intervals as part of a maintenance schedule.

Pre-flight checklist includes:
1. Visual inspection of the airframe

2. Visual inspections of rotor integrity
3. Check charge of all batteries (aerial vehicle, command station, radio repeater station)

An equivalent level of safety will be achieved because the UAS is small in size, will carry no external payload, will operate only in restricted predetermined areas and is not a complex mechanical devise. The operator of a UAS will ensure that it is in working order prior to initiating flight, perform required maintenance, and keep a log of any maintenance that is performed. Moreover, the operator is the person most familiar with the aircraft and is best suited to maintain the aircraft in an airworthy condition and to ensure an equivalent level of safety.

If mechanical issues arise, the UAS can land immediately due to the pre-determined area of operation. 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.