



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

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

April 9, 2015

Exemption No. 11315
Regulatory Docket No. FAA-2014-1037

Mr. Mark E. McKinnon
Counsel for The Climate Corporation
and Precision Planting, LLC
McKenna Long & Aldridge, LLP
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Dear Mr. McKinnon:

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.

The Basis for Our Decision

By letter dated December 10, 2014, you petitioned the Federal Aviation Administration (FAA) on behalf of The Climate Corporation and Precision Planting, LLC (hereinafter petitioner or operator) for an exemption. The exemption would allow the petitioner to operate an unmanned aircraft system (UAS) to conduct training, research and development, agriculture modeling, simulations, and imaging.

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 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. 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, The Climate Corporation and Precision Planting, LLC is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, The Climate Corporation and Precision Planting, LLC is hereafter referred to as the operator.

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

1. Operations authorized by this grant of exemption are limited to the DJI 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.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 April 30, 2017, unless sooner superseded or rescinded.

Sincerely,

/s/

John Barbagallo

Acting Deputy Director, Flight Standards Service

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December 10, 2014

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

Re: Petition of The Climate Corporation and Precision Planting LLC for an
Exemption Pursuant to Section 333 of the FAA Modernization and Reform Act
of 2012

Dear Program Analyst:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 ("Reform Act") and 14 C.F.R. Part 11, The Climate Corporation and related company Precision Planting LLC ("Climate"), both subsidiaries of the Monsanto Company, hereby apply for an exemption from the Federal Aviation Regulations ("FARs") identified below, to allow commercial agricultural operations of small unmanned aerial vehicles (*i.e.*, "small unmanned aircraft" or "UAS").

This petition for exemption is made based on information outlined in this Petition for Exemption, as well as the accompanying Climate UAS Operations Manual ("Operations Manual") and DJI Phantom 2 User Manual, Smart Flight Battery Safety Guidelines, Quick Start Guide, and Pilot Training Guide (collectively referred to as "Manufacturer's Manuals"). Climate submits these supporting materials as confidential documents pursuant to 14 C.F.R. § 11.35(b), as the materials contain confidential commercial and/or proprietary information that Climate has not and will not share with others. Additionally, these documents contain operating conditions and procedures that are not generally available to the public and are protected from release under the Freedom of Information Act, 5 U.S.C. § 552 *et seq.*, and any other requirements established by the FAA pursuant to Section 333 of the Reform Act.

For your convenience, this Petition is organized as follows:

- I. Description of Petitioner**
- II. Types of Operations**
 - A. R&D and Training
 - B. Commercial Precision Agriculture Modeling, Simulations and Imaging
- III. Relevant Statutory Authority**
- IV. Climate's Proposed UAS Operations Meet the Requirements of Section 333 of the Reform Act**
 - A. Approval is Warranted Based on the UAS's Size, Weight, Speed, and Operational Capability
 - B. Approval is Warranted Based on the Operational Restrictions Set Forth in the Operations Manual
- V. Regulations From Which Exemption is Sought**
 - A. 14 C.F.R. Part 21, Subpart H – Airworthiness Certificates and 14 C.F.R. § 91.203
 - B. 14 C.F.R. Part 27 Airworthiness Standards: Normal Category Rotorcraft
 - C. 14 C.F.R. § 91.7(a): Civil Aircraft Airworthiness
 - D. 14 C.F.R. § 91.9(b)(2): Civil Aircraft Flight Manual in the Aircraft and 14 C.F.R. § 91.203(a) and (b): Carrying Civil Aircraft Certification and Registration
 - E. 14 C.F.R. §§ 91.9(c), 45.23(b) and 45.27(a): Aircraft Marking and Identification Requirements
 - F. 14 C.F.R. § 91.103: Preflight Action
 - G. 14 C.F.R. § 91.109(a): Flight Instruction
 - H. 14 C.F.R. § 91.119: Minimum Safe Altitudes
 - I. 14 C.F.R. § 91.121: Altimeter Settings
 - J. 14 C.F.R. § 91.151(a): Fuel Requirements for Flight in VFR Conditions
 - K. 14 C.F.R. § 91.405(a), 91.407(a)(1), 91.409(a)(2); 91.417(a) and (b): Maintenance Inspections
 - L. 14 CFR § 61.113: Private Pilot Privileges and Limitations
- VI. Drug and Alcohol Program**
- VII. Public Interest**
- VIII. Privacy**
- IX. Federal Register Summary**
- X. Conclusion**

I. DESCRIPTION OF PETITIONER

Established in 1996 in Tremont, Illinois, Precision Planting LLC is a precision agriculture technology leader that develops the latest software, hardware and after-market production equipment to help farmers plant, harvest and analyze data from each field to improve yield and productivity. Precision Planting LLC manufactures a host of mechanical and monitoring products that allow farmers to produce more from their land while conserving more of our world's precious natural resources such as water and energy.

Established in 2006 in San Francisco, California, The Climate Corporation has built the agriculture industry's most advanced technology platform combining hyper-local weather monitoring, agronomic data modeling, and high-resolution weather simulations to deliver a complete suite of full-season monitoring, analytics, and risk-management products. These products help farmers boost yields on existing farmland and better manage risks that occur throughout a crop season. With multiple offices throughout the United States, The Climate Corporation's unique technologies help stabilize and improve a farmer's profits and, ultimately, help feed the world.

As of the date of this letter, The Climate Corporation's Climate Basic™ service was on over 50 million acres across the United States. Climate Basic is a free web and mobile service offering that uses advanced data science to help farmers optimize their daily decision making with field-level insights, from soil moisture levels, to crop growth stage, to current and future weather.

In 2012, Precision Planting was acquired by the Monsanto Company. In 2013, The Climate Corporation was acquired by the Monsanto Company.

Climate seeks an exemption to continue the long tradition of providing technologically driven and innovative solutions to solve important agronomic issues facing farmers and growers. Climate intends to use UASs for two primary purposes. First, Climate seeks an exemption to conduct training and research and development ("R&D") using UASs. Second, Climate seeks permission to use UASs for the commercial purpose of providing precision agriculture modeling, simulations and imaging.

The contact information for Petitioner is as follows:

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II. TYPES OF OPERATIONS

A. Training and R&D

Climate seeks the following exemptions to conduct training and research and development at Monsanto and Climate facilities and properties, as well as properties owned by third parties where Climate has obtained express written consent for the operation. The test areas will not be open to the public and access will be restricted to those persons necessary for the performance of the work. The primary focus of Climate's R&D efforts is to evaluate how to best incorporate the UAS into Climate's agricultural research, modeling, simulation and imaging business operations and technology.

In addition, Climate will conduct flight training, currency training, and maintenance test flights at these areas. These operations will be conducted under strict procedures that ensure that there is no possibility that the UAS will leave the test area or enter navigable airspace. These flights form a key part of Climate's safety strategy to ensure the highest level of flight crew competency as well as establishing the airworthiness of the UAS after any repair or overhaul.

B. Commercial Precision Agriculture Modeling, Simulations and Imaging

The second component of Climate's request for exemption focuses on the commercial application of UASs to provide precision agriculture modeling, simulations and imaging for agricultural customers. Traditionally, imaging technology from the agricultural survey and inspection industry has had to rely on the use of full-scale rotorcraft or fixed-wing aircraft. For more than a century, these aerial surveys and inspections have afforded farmers and growers with the critical information like imaging that they need to maximize crop yield, in a conservative and sustainable manner. However conventional operations using rotorcraft and fixed-wing aircraft in low level operations present the risks associated with vehicles weighing thousands of pounds and carrying large amounts of fuel. It is important to note that the use of small UAS will not only provide information in a more cost efficient, sustainable, and ultimately, much safer manner, but the quality of the information will be far superior. For example, the use of small UASs can provide improved resolution and flexibility in imaging as low-flying UASs can collect sub-millimeter resolution crop images that support analysis that is not possible with satellite or aircraft images. Additionally, UASs can fly specified routes and hover at particular locations in the field to capture high-resolution images of specific locations in the field.

III. RELEVANT STATUTORY AUTHORITY

This Petition for Exemption is submitted pursuant to Section 333(a) through (c) of the FAA Modernization and Reform Act of 2012 ("Reform Act"). Congress has directed the FAA "to safely accelerate the integration of civil unmanned aircraft systems into the national airspace

system." Pursuant to Section 333 of the Reform Act, the FAA Administrator is to permit unmanned aircraft systems to operate in the National Air Space ("NAS") where it is safe to do so based on the following considerations:

- The UAS's size, weight, speed and operational capability;
- Operation of the UAS in close proximity to airports and populated areas; and
- Operation of the UAS within the visual line of sight of the operator.

Additionally, the FAA Administrator has general authority to grant exemptions from the agency's safety regulations and minimum standards when the Administrator decides a requested exemption is in the public interest. *See* 49 U.S.C. § 106(f) (defining the authority of the Administrator); 49 U.S.C. § 44701(f) (permitting exemptions from §§ 44701(a), (b) and §§ 44702 – 44716, *et seq.*). A party requesting an exemption must explain the reasons why the exemption: (1) would benefit the public as a whole, and (2) would not adversely affect safety (or how it would provide a level of safety at least equal to the existing rules). *See* 14 C.F.R. § 11.81 (petitions for exemption).

IV. CLIMATE'S PROPOSED UAS OPERATIONS MEET THE REQUIREMENTS OF SECTION 333 OF THE REFORM ACT

Climate's proposed operations in this Petition for Exemption qualify for expedited approval pursuant to Section 333 of the Reform Act as each of the statutory criteria and relevant factors are satisfied.

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

Climate will use the DJI Phantom 2 quadcopter for the operations described in this Petition for Exemption. This UAS has a maximum take-off weight of less than 5 pounds. The UAS will be limited to a flight speed of 35 miles per hour or less, will not be flown in controlled airspace, and will be operated only in VFR conditions. All flights will be flown in such a way that they can be safely terminated with a reserve battery power of 25% of the battery's maximum charge. The DJI Phantom 2 does not carry any flammable propellant or fuel. The UAS also has an integrated GPS system that calculates the UAS's position and height and relays that information via a secure connection to the operator. The UAS's reliable communication range is 1000 meters, well within the distances that Climate will maintain between the operator and the vehicle. As a further means of protection, the UAS contains a failsafe mode if its connection to the remote control is lost, and this system permits the UAS to return to a predetermined location and land without injury or damage.

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

Together, the Climate Operations Manual and the Manufacturer's Manuals contain all the procedures and limitations necessary to successfully perform the operations specified in this Petition for Exemption. To assist the FAA in making a safety assessment of Climate's proposed operations, below is a summary of operational limitations and conditions that will ensure an equivalent or higher level of safety to operations conducted under current regulatory guidelines:

1. The UAS weighs 5 pounds or less.
2. Flights will be operated within the visual line of sight of a pilot and an observer, and well within the secure communication range of the controller.
3. Maximum total flight time for each operational flight will be limited to the amount of time the UAS can be flown and still maintain a reserve battery power of no less than 25%.
4. Flights will be operated at an altitude of no more than 400 feet AGL and will not be conducted within navigable controlled airspace without prior written authorization from the FAA.
5. Flights will be operated at a lateral distance of at least 500 feet from any persons, inhabited structures, vehicles or vessels that are not involved in the inspection unless permission has been received and appropriate waivers have been signed by the persons or property owners in advance.
6. Flights will be limited to a speed of 35 mph and vertical ascent will be limited to 15 mph.
7. Minimum crew for each operation will consist of a pilot, who will be Pilot-in-Command ("PIC") of the UAS, and one or more Visual Observers ("Observer") as necessary to safely conduct the mission.
8. The Observer designated for any operation will be in constant voice contact with the pilot.
9. The UAS will be operated and maintained according to the Manufacturer's Manuals and any manufacturer Safety Bulletins.
10. Prior to the operation, there will be a Mission Plan setting forth the operational limitations and conditions for the mission, as well as key personnel contact

information and a description of any potential hazards on or in the vicinity of the survey site.

11. Climate will file a Notice to Airman ("NOTAM") with an appropriate air traffic control ("ATC") facility between 72 and 48 hours before the flight.
12. A Certificate of Authorization ("COA") will be obtained prior to flight.
13. All required permissions and permits will be obtained from territorial, state, county or city jurisdictions, including local law enforcement, fire or other appropriate governmental agencies.
14. Climate will coordinate operations with the appropriate Flight Standards District Office ("FSDO").
15. If the UAS loses communication with the pilot, it will have the capability to return to a pre-determined location within the operational area and land safely.
16. Contingency plans will be in place to safely terminate flight if there is a loss of communication between the PIC and the Observer.
17. The UAS will have the capability to abort flight in the case of unpredicted obstacles or emergencies.
18. The PIC of the UAS will have at least a private pilot certificate and at least a current Class III Medical Certificate.
19. Observers must have at least a current Class III Medical Certificate.
20. All UAS operations will occur in daylight, VFR conditions. UAS Operations under Instrument Flight Rules, at night, or beyond visual line of sight are prohibited.

V. REGULATIONS FROM WHICH EXEMPTION IS SOUGHT

The Federal Aviation Act expressly grants the FAA the authority to issue exemptions. This statutory authority, by its terms, includes exempting civil aircraft, as the term is defined

under § 40101 of the Act, including UASs, from its safety regulations and minimum standards when the Administrator decides a requested exemption is in the public interest.¹

Climate seeks an exemption from several interrelated provisions of 14 C.F.R. Parts 21, 45, 61 and 91 for purposes of conducting the requested operations using a UAS. Listed below are: (1) the specific sections of 14 C.F.R. for which exemption is sought, and; (2) the operating procedures and safeguards that Petitioner has established which will ensure a level of safety better than or equal to the rules from which exemption is sought.²

A. 14 C.F.R. Part 21, Subpart H – Airworthiness Certificates and 14 C.F.R. § 91.203(a)(1)

The FAA has stated that no exemption is needed from this section if a finding is made under the Reform Act that the UAS selected provides an equivalent level of safety when compared to aircraft normally used for the same application. These criteria are met, and therefore no exemption is needed. *See* Grant of Exemption to Astraeus Aerial, Docket No. FAA-2014-0352 at 13-14, 22. If, however, the FAA determines that there are some characteristics of the chosen UAS that fail to meet the requirements of the Reform Act, an exemption is requested.

Equivalent Level of Safety

The UASs selected by Climate are safe when taking into account their size, weight, speed, and operational capability. As set forth in Section II, *supra*, the UAS weighs less than 5 pounds and will be flown at less than 35 mph and completely outside controlled airspace. Additionally, the UASs carry neither pilots nor passengers, carry no explosive materials or flammable liquid fuels, and operate exclusively within the parameters stated in the Operations Manual.

Operations conducted under this exemption will be closely controlled and monitored by the operator and will be conducted in compliance with local public safety requirements, to provide security for the area of operation. Climate will also provide the FAA with advance notice of all operations via NOTAMs and coordination with the local FSDO. In all cases, the

¹ *See* 49 U.S.C. § 44701(f) (authorizing the grant of exemptions from requirements of regulations prescribed pursuant to Sections 44701(a) and (b) and Sections 44702 - 44716).

² *See* 14 C.F.R. § 11.81(e), which requires a petition for exemption to include:

The reasons why granting 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 exemption.

UAS operated under the proposed conditions, will be at least as safe as, or safer than conventional rotorcraft operating with an airworthiness certificate.

Further, the UAS does not need a means to communicate with other aircraft or ATC, because those capabilities will be possessed by the PIC and Observer, who are not onboard. *See* Grant of Exemption, Docket FAA-2014-0352 at 13. In addition, no sense-and-avoid technology is necessary on the UAS because it will be operated at all times in VFR conditions and within visual line of sight. *Id.*

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

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

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

Inasmuch as there will be no airworthiness certificate issued for the UAS, Climate seeks an exemption from 14 C.F.R. § 91.7(a), which requires that a civil aircraft be in airworthy condition to be operated. The FAA has stated that no exemption is required for 14 C.F.R. § 91.7(a) to the extent that the requirements of Part 21 are waived or found inapplicable. *See* Grant of Exemption to Astraesus Aerial, Docket No. FAA-2014-0352 at 13-14, 22. Accordingly, Petitioner requests that the requirements for Section 91.7 be treated in accordance with Section V(A), *supra*.

D. 14 C.F.R. § 91.9(b)(2): Civil Aircraft Flight Manual in the Aircraft and 14 C.F.R. § 91.203(a) and (b): Carrying Civil Aircraft Certification and Registration

Pursuant to 14 C.F.R. § 91.9(b)(2):

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

...

(2) For which an Airplane or Rotorcraft Flight Manual is 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.

Pursuant to 14 C.F.R. § 91.203(a) and (b):

(a) Except as provided in § 91.715, no person may operate a civil aircraft unless it has within it the following:

(1) An appropriate and current airworthiness certificate...

(b) No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under § 91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

Given the small size and configuration of the UAS, it would be impossible to keep airworthiness documents and other aircraft manuals on board the UAS because there is simply no room. Also the UAS has no cabin or cockpit.

Equivalent Level of Safety

As acknowledged in an FAA Office of Chief Counsel's Opinion dated August 8, 2014, prepared by Dean E. Griffith, Attorney, AGC-220, the intent of 14 C.F.R. 91.9(b) and 91.203(a) and (b) is met if the pilot of the unmanned aircraft has access to the UAS flight manual, registration certificate, and other required documents from the ground control station from which he or she is operating the aircraft. The intent of the rule is to ensure the pilot has access to these key documents during flight. Therefore, an equivalent level of safety will be achieved by ensuring the pilot has access to the documents at the ground control station from which he or she is piloting the UAS.

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

Climate seeks an exemption from the aircraft marking and identification requirements contained in 14 C.F.R. §§ 91.9(c), 45.23(b) and 45.27(a).

- 14 C.F.R. § 91.9(c), Civil Aircraft Flight Manual, Marking and Placard requirements, provides that:

No person may operate a U.S.-registered civil aircraft unless that aircraft is identified in accordance with Part 45 of this chapter.

- 14 C.F.R. § 45.23(b), Markings of the Aircraft, states:

When marks include only the Roman capital letter "N" and the registration number is displayed on limited, restricted or light-sport category aircraft or experimental or provisionally certificated aircraft, the operator must also display on that aircraft near each entrance to the cabin, cockpit, or

pilot station, in letters not less than 2 inches nor more than 6 inches high, the words "limited," "restricted," "light-sport," "experimental," or "provisional," as applicable.

- 14 C.F.R. § 45.27(a), Rotorcraft, states:

Each operator of a rotorcraft must display on that rotorcraft horizontally on both surfaces of the cabin, fuselage, boom, or tail the marks required by § 45.23.

In a previous Grant of Exemption, the FAA determined that exemption from these requirements was warranted provided that the aircraft "have identification (N-Number) markings in accordance with 14 C.F.R Part 45, Subpart C if the markings are as large as practicable." FAA Docket No. FAA-2014-0352.

Equivalent Level of Safety

Climate will mark all UAS with their N-Number on the fuselage. The markings will be made as large as practicable.

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

Climate seeks an exemption from 14 C.F.R. § 91.103, which requires a PIC to become familiar with specific information before each flight, including information contained in the FAA-approved Flight Manual on board the aircraft. While the PIC will be familiar with all information necessary to safely conduct the flight, an exemption is requested to the extent that an FAA-approved Flight Manual is required.

Equivalent Level of Safety

An equivalent level of safety will be provided by following the Climate Operations Manual and the Manufacturer's Manuals. The PIC will take all required preflight actions - including performing all required checklists and reviewing weather, flight requirements, battery charge, landing and takeoff distance, aircraft performance data, and contingency landing areas - before initiation of flight. The Operations Manual and the Manufacturer's Manuals will be kept at the ground control station and will be accessible to the PIC at all times while operating the UAS.

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

Climate seeks an exemption from 14 C.F.R. § 91.109(a), which provides that "[n]o person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls." UASs and remotely piloted

aircraft, by their design, do not have functional dual controls. Instead, flight control is accomplished through the use of a device that communicates with the aircraft via radio communications.

Equivalent Level of Safety

Given the size and speed of the UAS that Climate intends to use, an equivalent level of safe training can still be performed without dual controls because no pilot or passengers are aboard the UAS, and as required by the Operations Manual, all persons will be a safe distance away in the event that the UAS experiences any difficulties during flight instruction. Moreover, Petitioner will conduct flight training at its R&D test sites, which are located on property it owns, leases or controls.³ As required by the Operations Manual, these training flights will be conducted in controlled and sterile areas where only persons who are participating in the work will be permitted. As a whole, the safety procedures provided for in Petitioner's Operations Manual ensure that the proposed UAS operations provide an equivalent or higher level of safety than the flight instruction regulations.

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

Climate requests an exemption from the minimum safe altitude requirements of 14 C.F.R. § 91.119. Section 91.119 prescribes the minimum safe altitudes under which aircraft may not operate, including 500 feet above the surface and away from any person, vessel, vehicle, or structure in non-congested areas. *See* 14 C.F.R. § 91.119(c). Section 91.119(d) allows for a helicopter to operate at less than those minimum altitudes when it can be operated "without hazard to persons or property on the surface," provided that "each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA."

An exemption is required because in order to perform the intended aerial surveys and inspections, the UAS will need to be operated lower than 400 feet AGL. Further, due to the nature of the proposed operations, the PIC and Observer(s) may at times be less than 500 feet away from the UAS.

Equivalent Level of Safety

Compared to flight operations with rotorcraft weighing far more than the maximum weights proposed herein, and given the lack of flammable fuel with the UASs, any risk associated with these operations is far less than those that presently exist with conventional

³ The FAA has approved exemptions for flight training without fully functional dual controls for a number of aircraft and for flight instruction in experimental aircraft. *See* Exceptions Nos. 5778K & 9862A.

aircraft. An equivalent level of safety will be achieved given the size, weight, and speed of the UASs, as well the controlled and sterile location where the operations will occur. In order to avoid any risk to manned aircraft, flight operations will be restricted to 400 feet AGL or below. As set forth in the Operations Manual, the UASs will be operated in a restricted area, away from persons or structures not involved in the operation.

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

This petition seeks an exemption from 14 C.F.R. § 91.121, which requires a person operating an aircraft to maintain cruising altitude or flight level by reference to an altimeter that is set to the elevation of the departure airport or barometric pressure. An exemption is required to the extent that the UASs do not have a barometric altimeter, but rather a GPS altitude read out.

Equivalent Level of Safety

The FAA has stated that an equivalent level of safety to the requirements of 14 C.F.R. § 91.121 can be achieved in circumstances where: (1) the UASs will be operated at 400 feet AGL or below, (2) within visual line-of-sight, (3) where GPS based altitude information is relayed in real time to the operator at a ground-based on-screen display and, (4) where prior to each flight, a zero altitude initiation point is established for the PIC to confirm accuracy of the onboard GPS. See Grant of Exemption to Astraeus Aerial, Docket No. FAA-2014-0352 at 21.

As the attached Operations Manual demonstrates, the UASs Climate intends to use meet these requirements. Moreover, our operating procedures require that a zero altitude initiation point be obtained prior to flight. Like Astraeus Aerial's petition for exemption, the UASs we intend to use, and the safety procedures contained in our Operations Manual, both ensure that an equivalent level of safety will be achieved, and a grant of exemption to the requirements of § 91.121 is therefore appropriate.

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

Climate requests an exemption from 14 C.F.R. § 91.151(a)'s fuel requirements for flight in VFR conditions. Section 91.151 states:

(a) No person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed –

(1) During the day, to fly after that for at least 30 minutes; or

(2) At night, to fly after that for at least 45 minutes.

Here, the technological limitations on UAS battery power means that no meaningful flight operations can be conducted while still maintaining a 30-minute battery reserve. An exemption from the fuel requirements of 14 C.F.R. § 91.151(a) is therefore required.

Equivalent Level of Safety

The FAA has stated that an equivalent level of safety can be achieved by requiring that each UAS operation be completed within 30 minutes flight time or with 25% battery power remaining, whichever occurs first. *See* Grant of Exemption to Astraeus Aerial, Docket No. FAA-2014-0352. The Operations Manual conforms to this limitation, and therefore provides an equivalent level of safety.

**K. 14 C.F.R. § 91.405(a), 91.407(a)(1), 91.409(a)(2); 91.417(a) and (b):
Maintenance Inspections**

Climate seeks an exemption from the maintenance inspection requirements contained in 14 C.F.R. § 91.405(a), 91.407(a)(1), 91.409(a)(2); 91.417(a) and (b). These regulations specify maintenance and inspection standards in reference to 14 C.F.R. Part 43. *See, e.g.*, 14 C.F.R. § 91.405(a) (stating that each owner or operator of an aircraft "[s]hall have the aircraft inspected as prescribed in subpart E of this part and shall between required inspections ...have discrepancies repaired as prescribed in part 43 of this chapter"). An exemption from these regulations is needed because Part 43 and these sections only apply to aircraft with an airworthiness certificate, which the UAS will not have.

Equivalent Level of Safety

An equivalent level of safety will be achieved because maintenance and inspections will be performed in accordance with the Manufacturer's Manuals and any applicable manufacturer Safety Bulletins. Further, as required by the Operations Manual, flights will not be conducted unless a pre-flight checklist covering all flight critical components of the UAS has been completed. The Operations Manual also contains recordkeeping requirements for routine, interval and post-flight maintenance. As a whole, the maintenance and inspection procedures in the Operations Manual ensure that an equivalent level of safety will be achieved.

L. 14 C.F.R. § 61.113: Private Pilot Privileges And Limitations

Petitioner seeks exemption from 14 CFR § 61.113, which restricts private pilot certificate holders from flying aircraft for compensation or hire, and would also require a second class medical certificate. The purpose of Part 61 is to ensure that the skill and competency of any PIC matches the airspace in which the PIC will be operating, as well as requiring certifications if the private pilot is carrying passengers or cargo for hire. In this case, while the UASs will be operated as part of a commercial operation, it carries neither passengers nor cargo.

In the Grant of Exemption to Astraerus Aerial (FAA Docket No. FAA-2014-0352), the FAA determined that the unique characteristics of UAS operation outside of controlled airspace did not warrant the additional costs and restrictions attendant with requiring the PIC to have a commercial pilot certificate and Class II Medical Certificate.

The restrictions Climate has placed on its UAS operations meet or exceed the restrictions similarly imposed on Astraerus Aerial in FAA Docket No. FAA-2014-0352. Climate will only perform UAS operations in controlled and sterile areas away from persons and property not involved in the operation. The UASs will be flown based on visual line of sight at 400 feet AGL or below. Moreover, a NOTAM will be issued between 48 and 72 hours before the flight is to occur, and the flight will be conducted in coordination with the applicable FSDO.

Equivalent Level of Safety

In addition to these flight restrictions, Climate will further ensure safe operation by requiring that any PIC be thoroughly versed not only in airspace and communication requirements of Part 91 applicable to all aircraft, but also in the unique aspects of UAS flight. Petitioner's pilots will be required to maintain an understanding of all normal, abnormal and emergency procedures of the UAS he or she is operating. Pilots will also be required to accumulate and log, in a manner consistent with 14 C.F.R. § 61.51(b), a minimum of 200 flight cycles and 25 hours of total time as a UAS rotorcraft pilot, and at least 10 hours piloting the UAS used to perform operations under this exemption. Petitioner's pilots will also be required to log at least 3 takeoffs and landings of the UAS used to perform operations under this exemption. The pilot currency requirements in our Operations Manual also require the pilot to have conducted at least 3 launch and recovery operations, and have accrued at least 5 hours of flight time with the UAS in the preceding 90 days to be considered current. The Operations Manual, including its pilot qualification, training, and currency requirements, ensure that our pilots are competent and proficient in the UAS they are operating. These procedures ensure that an equivalent or higher level of safety will be achieved.

VI. DRUG AND ALCOHOL PROGRAM

Climate has policies in place to ensure that no person may participate as a member of the flight team if they are under the influence of alcohol or any drug.

VII. PUBLIC INTEREST

The public interest will be served by granting Climate's Petition for Exemption. Congress has established a national policy that favors early integration of UAS into the National Airspace System ("NAS") in controlled, safe working environments such as those proposed in this Petition. Granting this Petition for Exemption helps fulfill Congress' goal in passing Section

333(a) through (c) of the Reform Act—the FAA Administrator's assessment of whether certain UAS may operate safely in the NAS before completion of the statutorily required rulemaking.

The proposed UAS operations in this Petition for Exemption significantly improve safety and reduce risk by alleviating the public's exposure to danger and emissions associated with traditional agricultural aerial survey and inspection methods, namely, full size fixed-wing aircraft and rotorcraft. The UASs Petitioner intends to use are battery powered and create no emissions. Moreover, in the unlikely event that one of Petitioner's UASs crash, there is no fuel to ignite and explode. Any accident involving Petitioner's lightweight UASs will present significantly less danger to the pilot and other individuals on the ground than one involving a full size helicopter.

Moreover, agricultural modeling, simulations and imaging resulting from Climate's UAS use will help provide farmers and growers with the information they need to produce more from their land while also conserving valuable resources like water and energy. The public as a whole will benefit from an agricultural industry that can harness the power of new technologies to produce more crops in a cost-effective, sustainable and environmentally conscious manner.

VIII. PRIVACY

All Climate UAS operations shall be conducted in accordance with applicable federal, state, or local laws regarding privacy. Climate will not conduct flight operations over property that it does not own or control without the prior consent and knowledge of the property owner. Moreover, Climate will not capture or use images from neighboring properties within the vicinity of UAS flight operations.

IX. FEDERAL REGISTER SUMMARY

Pursuant to 14 C.F.R. Part 11, the following summary is provided for publication in the Federal Register, should it be determined that publication is needed:

Petitioner seeks an exemption from the following rules in Title 14 of the Code of Federal Regulations:

Part 21, Subpart H; Part 27; 45.23(b); 45.27(a); 61.113; 91.7(a); 91.9(b)(2); 91.9(c); 91.103; 91.109(a); 91.119; 91.121; 91.151(a); 91.203 (a) & (b); 91.405(a); 91.407(a)(1); 91.409(a)(2); 91.417 (a) & (b).

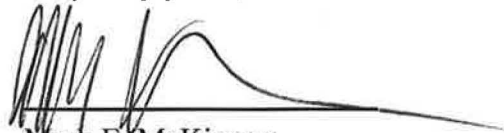
The exemption will enhance safety by reducing risk to the general public and property owners from the substantial hazards associated with performing equivalent agricultural aerial surveys and inspections with conventional fixed-wing aircraft, rotorcraft, or other methods.

X. CONCLUSION

Climate's Petition for Exemption satisfies the criteria articulated in Section 333 of the Reform Act of 2012 including weight, speed, operating capabilities, proximity to airports and populated areas, operation within visual line of sight and national security. The proposed UAS operations will benefit the public as a whole by improving safety and reducing risk by alleviating human exposure to danger. The public also benefits from improving the quality and cost-effectiveness of comparable agricultural surveys and inspections completed with conventional flight operations.

In consideration of the foregoing, the Petition provides the FAA with more than adequate justification for granting of the requested exemptions allowing Climate to perform R&D and commercial precision agricultural modeling, simulations and imaging using UASs in accordance with this Petition and the attached Operations Manual.

Very truly yours,

A handwritten signature in black ink, appearing to read 'Mark E. McKinnon', written over a horizontal line.

Mark E. McKinnon

Matthew J. Clark

Counsel for Petitioner

(The following attached items contain proprietary and commercial information exempt from disclosure under the Freedom of Information Act, 5 U.S.C. § 522 *et seq.*, and should be held in a separate file pursuant to 14 C.F.R. § 11.35(b)).

Attachment A: The Climate Corporation UAS Operations Manual

Attachment B: DJI Phantom 2 User Manual

Attachment C: DJI Smart Flight Battery Safety Guidelines

Attachment D: Phantom 2 Quick Start Guide

Attachment E: Phantom 2 Pilot Training Guide