

Exemption No. 11177

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, DC 20591

In the matter of the petition of

**BOSH PRECISION AGRICULTURE
(DBA DIGITAL HARVEST)**

Regulatory Docket No. FAA-2014-0858

for an exemption from part 21; §§ 45.23(b);
61.113(a) and (b); 61.133(a); 91.7(a) and (b);
91.9(b)(2); 91.109(a); 91.119(c); 91.151(a);
91.203(a) and (b); 91.405(a); 91.407(a)(1);
91.409(a)(2); and 91.417(a) of Title 14, Code
of Federal Regulations

GRANT OF EXEMPTION

By letter dated October 14, 2014, Mr. Young Kim, Chief Executive Officer, (hereinafter Petitioner or Operator), BOSH Precision Agriculture (dba Digital Harvest), 701 Flag Stone Way, Suite B, Newport News, Virginia, 23608 petitioned the Federal Aviation Administration (FAA) for an exemption from part 21, §§ 45.23(b), 61.113(a) and (b), 61.133(a), 91.7(a) and (b), 91.9(b)(2), 91.109(a), 91.119(c), 91.151(a), 91.203(a) and (b), 91.405(a), 91.407(a)(1), 91.409(a)(2), and 91.417(a) of Title 14, Code of Federal Regulations (14 CFR). The exemption would allow the petitioner to operate the BOSH Technologies Super Swiper unmanned aircraft system (UAS) to conduct commercial precision agricultural surveys.

The petitioner requests an exemption from the following regulations:

Part 21 prescribes, in pertinent part, the procedural requirements for issuing and changing design approvals, production approvals, airworthiness certificates, and airworthiness approvals.

Section 45.23(b) prescribes, in pertinent part, that 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.

Section 61.113(a) and (b) prescribes that—

- (a) No person who holds a private pilot certificate may act as a pilot in command (PIC) of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as PIC of an aircraft.
- (b) A private pilot may, for compensation or hire, act as PIC of an aircraft in connection with any business or employment if—
 - (1) The flight is only incidental to that business or employment; and
 - (2) The aircraft does not carry passengers or property for compensation or hire.

Section 61.133(a) prescribes, in pertinent part, that for privileges—

- (1) *General.* A person who holds a commercial pilot certificate may act as pilot in command of an aircraft—
 - (i) Carrying persons or property for compensation or hire, provided the person is qualified in accordance with this part and with the applicable parts of this chapter that apply to the operation; and
 - (ii) For compensation or hire, provided the person is qualified in accordance with this part and with the applicable parts of this chapter that apply to the operation.

Section 91.7(a) and (b) prescribes that—

- (a) No person may operate a civil aircraft unless it is in an airworthy condition.
- (b) The pilot in command of a civil aircraft is responsible for determining whether that aircraft is in condition for safe flight. The pilot in command shall discontinue the flight when unairworthy mechanical, electrical, or structural conditions occur.

Section 91.9(b)(2) prohibits operation of U.S.-registered civil aircraft, for which an Airplane or Rotorcraft Flight Manual is not required, 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.

Section 91.109 prescribes, in pertinent part, that no 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.

Section 91.119(c) prescribes that, except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

- (c) Over other than congested areas. 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.

Section 91.151(a) prescribes that no person may begin a flight in an airplane under visual flight rules (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.

Section 91.203(a) prohibits, in pertinent part, any person from operating a civil aircraft unless it has within it (1) an appropriate and current airworthiness certificate; and (2) an effective U.S. registration certificate issued to its owner or, for operation within the United States, the second copy of the Aircraft Registration Application as provided for in § 47.31(c).

Section 91.203(b) prescribes, in pertinent part, that no person may operate a civil aircraft unless the airworthiness certificate 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.

Section 91.405(a) requires, in pertinent part, that an aircraft operator or owner shall have that aircraft inspected as prescribed in subpart E of the same part and shall, between required inspections, except as provided in paragraph (c) of the same section, have discrepancies repaired as prescribed in part 43 of this chapter.

Section 91.407(a)(1) prescribes that no person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless it has been approved for return to service by a person authorized under § 43.7 of the same chapter.

Section 91.409(a)(2) prescribes, in pertinent part, that no person may operate an aircraft unless, within the preceding 12 months, it has had an inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.

Section 91.417(a) prescribes, in pertinent part, that—

- (a) Each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:
- (1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—
 - (i) A description (or reference to data acceptable to the Administrator) of the work performed; and
 - (ii) The date of completion of the work performed; and
 - (iii) The signature and certificate number of the person approving the aircraft for return to service.
 - (2) Records containing the following information:
 - (i) The total time in service of the airframe, each engine, each propeller, and each rotor.
 - (ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.
 - (iii) The time since last overhaul of all items installed on the aircraft that are required to be overhauled on a specified time basis.
 - (iv) The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained.
 - (v) The current status of applicable airworthiness directives (AD) and safety directives including, for each, the method of compliance, the AD or safety directive number and revision date. If the AD or safety directive involves recurring action, the time and date when the next action is required.
 - (vi) Copies of the forms prescribed by § 43.9(d) for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances.

The petitioner supports its request with the following information:

The petitioner proposes to operate the BOSH Technologies Super Swiper UAS to conduct precision agricultural surveys. See Appendix A for the petition submitted to the FAA describing the proposed operations.

The Super Swiper is a fixed wing UAS with fuselage is made of expanded polypropylene (EPP) foam and high-impact plastic and wings made of EPP foam and composites. The SUPER SWIPER can be flown manually, semi-manually or automatically. It has a wingspan of 74 inches, is 72 inches long, and 10 inches high. Total weight is under ten pounds. It has a single electric motor and propeller, and powered by a lithium polymer battery. It is hand launched and lands on the fuselage belly. The UA is operated at cruise speeds of 30-70 miles per hour, with a maximum speed of 75 miles per hour.

The petitioner has provided the following information to support its request for an exemption, which includes proprietary supporting documents. The petition and the following supporting documentation are hereinafter referred to as the operating documents:

- 1) SUPER SWIPER Description of Aircraft System
- 2) SUPER SWIPER Communication System Description
- 3) SUPER SWIPER Control Station
- 4) SUPER SWIPER No TSO Components
- 5) SUPER SWIPER Launch and Recovery
- 6) SUPER SWIPER LOST Link
- 7) UAV Observer
- 8) Super Swiper Training Syllabus
- 9) Super Swiper UAS Emergencies
- 10) Super Swiper Checklist

The FAA evaluated Bosh Precision Agriculture's petition and determined it was not precedent-setting. Therefore, a summary of the petition was not published in the Federal Register for public comment.

The FAA's analysis is as follows:

The FAA has organized its analysis into four sections: (1) UAS, (2) the UAS pilot in command (PIC), (3) the UAS operating parameters, and (4) the public interest.

UAS

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts*. In accordance with the statutory criteria provided in Section 333 of P.L. 112-95 in reference to 49 USC § 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.

Manned aircraft conducting aerial surveys can weigh 5,000 pounds or more and are operated by an onboard pilot, in addition to other onboard crewmembers, as necessary. The petitioner's UA will weigh less than 10 lbs. with no onboard pilot or crew. The pilot and crew will be remotely located from the aircraft. The limited weight significantly reduces the potential for harm to participating and nonparticipating individuals or property in the event of an incident or accident. The risk to an onboard pilot and crew during an incident or accident is eliminated with the use of a UA for the precision agricultural surveying operation.

Manned aircraft are at risk of fuel spillage and fire in the event of an incident or accident. The UA carries no fuel, and therefore the risk of fire following an incident or accident due to fuel spillage is eliminated.

During agricultural surveys with manned aircraft under the conditions of an FAA issued Certificate of Waiver or Authorization (COA), aircraft can be operated in very close proximity to participating persons. The safety of these individuals is maintained through use of an aircraft with standard airworthiness certification under 14 CFR part 21, Subpart H, operation of the aircraft by a qualified and competent pilot, and operating according to limitations necessary to ensure safety. Compared to manned aircraft, the UA being operated by the petitioner reduces the risk to persons and property in close proximity to the aircraft due to the limited size, weight, operating conditions, and design safety features of the UAS. This exemption does not require an electronic means to monitor and communicate with other aircraft, such as transponders or sense and avoid technology. Rather the FAA is mitigating the risk of these operations by placing limits on altitude, requiring stand-off distance from clouds, permitting daytime operations only, and requiring that the UA be operated within visual line of sight and yield right of way to all manned operations. Additionally, the exemption provides that the operator will request a Notice to Airman (NOTAM) prior to operations to alert other users of the NAS.

The petitioner's UAS has the capability to operate safely after experiencing certain in-flight failures. The UA is also able to respond to a lost-link event with a pre-coordinated, predictable, automated flight maneuver. The FAA also believes that the built-in safeguards and automatic fail-safe modes described in the petitioner's operating documents are sufficient to mitigate risks associated with the loss of GPS signal. These additional safety features ensure that these operations will not adversely impact the safety of participating and nonparticipating individuals.

Regarding the petitioner's requested relief from 14 CFR § 45.23(b) *Display of marks* and § 91.319(a) (1) *Aircraft having experimental certificates*, the petitioner's request is made under the assumption that marking with the word "experimental" will be required as a condition of an exemption request. However, this marking is reserved for aircraft that are issued experimental certificates under 14 CFR § 21.191. Since the petitioner's UAS will not be certificated under 14 CFR § 21.191, a grant of exemption from 14 CFR § 45.23(b) is not

necessary. Similarly, relief from 91.319(a)(1), which was included in Appendix A of the petition, is also not applicable nor necessary.

The petitioner requests relief from 14 CFR §§ 91.405 (a) *Maintenance required*, 91.407(a)(1) *Operation after maintenance, preventive maintenance, rebuilding, or alteration*, 91.409(a)(2) *Inspections*, and 91.417(a) *Maintenance records*. The FAA has evaluated the petitioner's request and determined that cause for exemption from these requirements is warranted. The FAA notes that the petitioner's operating documents contain preflight checks for the UAS. The FAA has also determined that relief from § 91.409(a)(1) is also necessary because it is an alternate inspection requirement of § 91.409(a)(2). Similarly, exemption from § 91.417(b) is necessary in addition to § 91.417(a). The FAA finds that adherence to the operating documents, as well as the conditions and limitations below, is sufficient to ensure that safety is not adversely affected.

UAS PIC

Regarding the petitioner's requested relief from 14 CFR § 61.113(a) and (b), *Private pilot privileges and limitations* and 14 CFR 61.133(a) *Commercial pilot privileges and limitations*, the petitioner requested regulatory relief to operate his UAS without an FAA-certificated pilot. However, the FAA does not possess the authority to exempt the petitioner from the statutory requirement to hold an airman certificate, as prescribed in 49 USC § 44711. Although Section 333 provides limited flexibility to the statutory requirement to hold an airworthiness certificate, it does not provide flexibility for other requirements of title 49. For further information see Exemption No. 11110, Trimble Navigation, Ltd.

The FAA is also requiring a pilot certificate for UAS operations because pilots holding an FAA issued private or commercial pilot certificate are subject to the security screening by the Department of Homeland Security that certificated airmen undergo. As previously determined by the Secretary of Transportation, the requirement to have an airman certificate ameliorates security concerns over civil UAS operations conducted in accordance with Section 333.

Given these grounds, the FAA must determine the appropriate level of pilot certification for the petitioner's proposed operation.

Under current regulations, civil operations for compensation or hire require a PIC holding a commercial pilot certificate per 14 CFR part 61. Based on the private pilot limitations in accordance with pertinent parts of 14 CFR § 61.113(a) and (b), a pilot holding a private pilot certificate cannot act as a PIC of an aircraft for compensation or hire unless the flight is only incidental to a business or employment. However, in Grant of Exemption No. 11062 to Astraeus Aerial (Astraeus), the FAA determined that a PIC with a private pilot certificate operating the Astraeus UAS would not adversely affect operations in the NAS or present a hazard to persons or property on the ground.

The petitioner proposes to operate with a pilot who does not possess an FAA issued pilot certificate. This is similar to other petitions for exemption previously filed with and considered by the FAA. As in Exemption Nos. 11062 (Astraeus) and 11138 (Douglas Trudeau), the FAA has analyzed the petitioner's proposed operation and determined it does not differ significantly from these grants of exemption. The petitioner plans to operate in the NAS over controlled access property with the permission of the land owner/controller, while also limiting property access to consenting participants while operations are underway. Given: 1) the similar nature of the petitioner's proposed operating environment to that of Astraeus, 2) the parallel nature of private pilot aeronautical knowledge requirements to those of commercial requirements [ref: Exemption No. 11062], and 3) the airmanship skills necessary to operate the UAS, the FAA finds that the additional manned airmanship experience of a commercially certificated pilot would not correlate to the airmanship skills necessary for the petitioner's proposed operations. Therefore, the FAA finds that a PIC holding a private pilot certificate and a third-class airman medical certificate is appropriate for the proposed operations.

With regard to the airmanship skills necessary to operate the UAS, the petitioner has proposed pilot qualification criteria and a training program. The conditions and limitations below stipulate that the petitioner may not permit any PIC to operate unless that PIC has completed the petitioner's training program, that the PIC is able 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. The petitioner is responsible for assessing its operations and identifying any additional skills required to operate safely under normal and abnormal conditions. Normal condition skills may include the ability to maintain altitude, maintain VLOS, and navigational skills. Abnormal condition skills may include the ability to avoid obstacles, avoid air traffic, and respond to loss of link.

In conclusion, the FAA finds that a PIC holding a private pilot certificate and a third-class medical certificate, and who has completed the petitioner's training program, can conduct the proposed UAS operations without adversely affecting the safety of the NAS and persons or property on the ground. Upon consideration of the overall safety case presented by the petitioner, the FAA finds that granting the requested relief from 14 CFR § 61.113(a) and (b) is warranted. Additionally, relief from 14 CFR § 61.133(a) is not necessary.

The petitioner has also indicated it will supplement its proposed operation(s) with a visual observer (VO) who has completed the petitioner's training program. The conditions and limitations below stipulate that the PIC must ensure that the VO can perform the functions prescribed in the operating documents. The petitioner's operating documents require the VO to hold an FAA second-class medical certificate, nevertheless the FAA has previously determined that a medical certificate is not necessary for the VO and will not require one for operations conducted under this exemption. *See* Exemption No. 11062 to Astraeus. The UA must never be operated beyond the actual visual capabilities of the VO, and the VO and PIC

must have the ability to maintain VLOS with the UA at all times. It is the responsibility of the PIC to be aware of the VO's visual limitations and limit operations of the UA to distances within the visual capabilities of both the PIC and VO. The petitioner's operating documents suggest that additional observers may be employed to extend the range of UAS operations. As stipulated in the conditions and limitations contained herein, the UA must remain within VLOS of the PIC at all times during flight.

UAS Operating Parameters

The petitioner requested relief from 14 CFR § 91.7(a) *Civil aircraft airworthiness* and the FAA finds that relief is necessary. While the petitioner's UAS will not require an airworthiness certificate in accordance with 14 CFR part 21, Subpart H, the FAA considers the petitioner's compliance with its operating documents to be a sufficient means for determining an airworthy condition. Therefore, relief from § 91.7(a) is granted. The petitioner is still required to ensure that its aircraft is in an airworthy condition – based on compliance with the operating documents prior to every flight, and as stated in the conditions and limitations below.

In accordance with 14 CFR § 91.7(b) *Civil Aircraft Airworthiness*, the PIC of the UAS is responsible for determining whether the aircraft is in a condition for safe flight. The FAA, as in grant of Exemption No. 11062 to Astraeus, has determined that the operating documents include procedures to be used prior to each flight that can ensure compliance with § 91.7(b). The petitioner is required to ensure that its aircraft is in a condition for safe flight – based on compliance with the operating documents– prior to every flight. Therefore, relief from § 91.7(b) is not granted.

Regarding the petitioner's requested relief from 14 CFR § 91.9(b)(2) *Civil aircraft flight manual, marking, and placard requirements* and 14 CFR § 91.203(a) and (b) *Civil aircraft: Certifications required*, the FAA has previously determined in Grant of Exemption 11062, Astraeus Aerial, that relief from these sections is not necessary. Relevant materials may be kept in a location accessible to the PIC in compliance with the regulations.

The petitioner requested relief from 14 CFR § 91.109(a) *Flight instruction; Simulated instrument flight and certain flight tests*, but did not present a scenario in which dual flight controls may be required for the purposes of pilot training on its UAS. Rather, the petitioner intends to accomplish training as described in the operating documents. Furthermore, the FAA is requiring that the petitioner's PIC possess at least a private pilot's certificate. Also, this exemption will require that training operations only be conducted during dedicated training sessions. The FAA finds that safety will not be adversely impacted if the petitioner follows the training outlined in the operating documents. Therefore, the FAA finds that relief is not necessary.

The petitioner requested relief from 14 CFR § 91.119(c) *Minimum safe altitudes: Over other than congested areas*. However in requesting that relief the petitioner did not describe any

measures put in place to protect persons not directly participating in the agricultural survey flight operation, citing rather that the size, weight, speed and construction of the UA, along with the requirement to obtain land owner/controller approval in advance, achieved a level of safety equivalent to that provided by § 91.119(c). Nor did the petitioner describe any minimum stand-off distances from non-participating persons, vehicles or structures.

Regarding stand-off distances from persons, vessels, vehicles and structures, 14 CFR §91.119(c) requires that aircraft operate no closer than 500 feet to these persons or objects. As discussed in Exemption No. 11109 (Clayco, Inc.), operations conducted closer than 500 feet to the ground may require that the UA be operated closer than 500 feet to essential persons, or objects that would not be possible without additional relief. Therefore, the FAA is requiring that prior to conducting UAS operations, all persons not essential to flight operations (nonparticipating persons) must remain at appropriate distances. In open areas, this requires the UA to remain 500 feet from all non-participating persons other than essential flight personnel (i.e. PIC, VO, operator trainees or essential persons).

The FAA has also considered that the UA will weigh about 10 pounds. If barriers or structures are present that can sufficiently protect nonparticipating persons from the UA or debris in the event of an accident, then the UA may operate closer than 500 feet to persons afforded such protection. The operator must also 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. When considering how to immediately cease operations, the primary concern is the safety of those nonparticipating persons. In addition, the FAA finds that operations may be conducted closer than 500 feet to vessels, vehicles and structures when the land owner/controller grants such permission and the PIC makes a safety assessment of the risk of operating closer to those objects and determines that it does not present an undue hazard. Thus, the FAA finds that relief from § 91.119(c) is warranted provided adherence to the procedures in the operating documents and the FAA's additional conditions and limitations outlined below. Thus, the FAA finds that relief from § 91.119(c) is warranted provided the petitioner adheres to the procedures in the operating documents and the FAA's additional conditions and limitations outlined below.

The petitioner also noted that it will avoid congested or populated areas “which are depicted in yellow on VFR charts.” Since there is no precise definition of the term “congested area” and because aeronautical charts and NOTAMS provide only general guidance for developing a proposed route that complies with § 91.119, the UAS petitioner should consult with the local Flight Standards District Office (FSDO) to discuss areas that would reasonably be considered “congested” within proximity of the proposed operations. Ultimately, the PIC is responsible for maintaining the minimum safe altitudes required in § 91.119.

The petitioner did not request relief from 14 CFR § 91.121 *Altimeter settings* but the FAA finds that relief is necessary because the UAS does not include a typical barometric altimeter

onboard the aircraft. The UA's altitude is determined by the global positioning system (GPS) and transmitted by data link to the ground control station. As stated in the conditions and limitations below, the FAA requires any altitude reported to air traffic control (ATC) to be in feet above ground level (AGL). The petitioner may choose to set the GPS altitude indicator to zero feet AGL rather than local barometric pressure or field altitude before flight. Considering the limited altitude of the proposed operations, relief from 14 CFR § 91.121 is granted to the extent necessary to comply with the applicable conditions and limitations stated below.

Regarding the petitioner's requested relief from § 91.151(a) *Fuel requirements for flight in VFR conditions*, prior relief has been granted for manned aircraft to operate at less than prescribed minimums, including Exemption Nos. 2689, 5745, and 10650. In addition, similar UAS-specific relief has been granted in Exemption Nos. 8811, 10808, and 10673 for daytime, VFR conditions. The petitioner proposes that an equivalent level of safety can be achieved with "ten minutes of reserve fuel" in view of the day VFR and VLOS operating restrictions. The petitioner notes that while operating under VLOS restrictions, the UA will always be within 5 minutes of its landing position. According to the operating documents the UAS has two automatically triggered fail-safe functions relating to low battery power. The "low battery" function results in the UA heading home. The "critical battery" function results in an immediate landing. The petitioner did not specify how ten minutes of reserve fuel would be known to the PIC since the power read-out at the GCS is in voltage. Nevertheless, the proposed operating parameters and inherent fail-safe functions of the UAS provide the FAA with sufficient reason to grant the relief from 14 CFR § 91.151(a)(1) in accordance with the conditions and limitations below. The PIC would be prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough power to fly to the intended landing point at normal cruising speed and land the UA with 10 minutes of power remaining in reserve.

This exemption requires that the operator obtain a Certificate of Authorization or Waiver (COA) from the FAA. As part of that process the FAA Air Traffic Organization evaluates whether the operations could be conducted safely in the requested airspace. The majority of current UAS operations occurring in the national airspace system (NAS) are being coordinated through ATC by the issuance of a COA. This process not only makes local ATC facilities aware of UAS operations, but also provides ATC the ability to consider airspace issues that are unique to UAS operations. The COA will require the operator to request a NOTAM, which is the mechanism for alerting other users of the NAS to the UAS activities being conducted. The conditions and limitations below prescribe the requirement for the petitioner to obtain an ATO-issued COA.

Public Interest

The FAA finds that this grant of exemption is in the public interest. The enhanced safety achieved using a 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 operations enabled by this exemption are in the public interest.

The table below summarizes the FAA’s determinations regarding regulatory relief:

Relief considered (14 CFR)	FAA determination (14 CFR)
Part 21	Relief not necessary
45.23(b)	Relief not necessary
61.113(a) and (b)	Relief granted with conditions and limitations
61.133(a)	Relief not necessary
91.7(a)	Relief granted with conditions and limitations
91.7(b)	Relief not granted
91.9(b)(2)	Relief not necessary
91.109(a)	Relief not necessary
91.119(c)	Relief granted with conditions and limitations
91.121	Relief granted with conditions and limitations
91.151(a)	Relief granted for paragraph (a)(1), day, with conditions and limitations
91.203(a) and (b)	Relief not necessary
91.405(a)	Relief granted with conditions and limitations
91.407(a)(1)	Relief granted with conditions and limitations
91.409(a)(1) and (2)	Relief granted with conditions and limitations
91.417(a) and (b)	Relief granted with conditions and limitations

The FAA’s 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, Bosh Precision Agriculture dba Digital Harvest is granted an exemption from 14 CFR §§ 61.113(a) and (b), 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 petitioner to operate a UAS to conduct commercial precision agricultural surveys. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

Relative to this grant of exemption, BOSH Precision Agriculture (dba Digital Harvest) is hereafter referred to as the operator.

The petition and the following supporting documentation are hereinafter referred to as the operating documents:

- 1) SUPER SWIPER Description of Aircraft System
- 2) SUPER SWIPER Communication System Description
- 3) SUPER SWIPER Control Station
- 4) SUPER SWIPER No TSO Components
- 5) SUPER SWIPER Launch and Recovery
- 6) SUPER SWIPER LOST Link
- 7) UAV Observer
- 8) Super Swiper Training Syllabus
- 9) Super Swiper UAS Emergencies
- 10) Super Swiper Checklist

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 following aircraft described in the operating documents, which is a single engine fixed wing aircraft weighing less than 10 pounds: BOSH Technologies Super Swiper. Proposed operations of any other aircraft will require a new petition or a petition to amend this grant.
- 2) UAS operations under this exemption are limited to conducting operations for the purpose of commercial precision agricultural surveys.
- 3) The UA may not be flown at a speed exceeding 75 mph.
- 4) The UA must be operated at an altitude of no more than 400 feet above ground level (AGL), as indicated by the procedures specified in the operating documents. All altitudes reported to ATC must be 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.
- 6) All operations must utilize a visual observer (VO). The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. This requires the VO 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. 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 functions prescribed in the operating documents.

- 7) The operating documents and this grant of exemption 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 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 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) Prior to each flight the PIC must inspect the UAS to ensure it is in a condition for safe flight. 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. The Ground Control Station must be included in the preflight inspection. All maintenance and alterations must be properly documented in the aircraft records.
- 9) 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. The PIC who conducts the functional test flight must make an entry in the aircraft records.
- 10) The pre-flight inspection must account for all potential discrepancies, e.g. inoperable components, items, or equipment, not already covered in the relevant sections of the operating documents.
- 11) The operator must follow the UAS manufacturer's aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements.
- 12) The operator must carry out its maintenance, inspections, and record keeping requirements, in accordance with the operating documents. Maintenance, inspection, alterations, and status of replacement/overhaul component parts must be noted in the aircraft records, including total time in service, description of work accomplished, and the signature of the person authorized to return the UAS to service.

- 13) Each UAS operated under this exemption must comply with all manufacturer Safety Bulletins.
- 14) The person authorized to return the UAS to service must make an entry in the aircraft record of the corrective action taken against discrepancies discovered between inspections.
- 15) The PIC must possess at least a private pilot certificate and at least a current third-class medical certificate. 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.
- 16) The operator may not permit any PIC to operate unless the PIC meets the operator's qualification criteria and 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 must be logged in a manner consistent with 14 CFR § 61.51(b). The VO is also required to complete the operator's training requirements. A record of training must be documented and made available upon request by the Administrator. Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building), 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.
- 17) The operator may not permit the PIC to operate the UAS for the purpose of precision agricultural surveying (or similar operations), unless the PIC has demonstrated and logged in a manner consistent with 14 CFR § 61.51(b), 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 people, vessels, vehicles and structures.
- 18) 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.
- 19) The UA may not operate within 5 nautical miles of an airport reference point as denoted on a current FAA-published aeronautical chart unless a letter of agreement with that airport's management is obtained, and the operation is conducted in accordance with a NOTAM as required by the operator's COA. The letter of agreement with the airport management must be made available to the Administrator upon request.

- 20) 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.
- 21) If the UA loses communications or loses its GPS signal, it must return to a pre-determined location within the planned operating area and land or be recovered in accordance with the operating documents.
- 22) The PIC must abort the flight in the event of unpredicted obstacles or emergencies in accordance with the operating documents.
- 23) The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough power to fly at normal cruising speed to the intended landing point and land the UA with 10 minutes of battery power remaining.
- 24) The operator must obtain an Air Traffic Organization (ATO) issued Certificate of Waiver or Authorization (COA) prior to conducting any operations under this grant of exemption. This COA will also require the operator to request a Notice to Airman (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to the operation. All operations shall be conducted in accordance with airspace requirements in the ATO issued COA including class of airspace, altitude level and potential transponder requirements.
- 25) 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.
- 26) Before conducting operations, the radio frequency spectrum used for operation and control of the UA must comply with the Federal Communications Commission (FCC) or other appropriate government oversight agency requirements.
- 27) The 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 UAS is operating. These documents must be made available to the Administrator or any law enforcement official upon request.
- 28) The UA must remain clear and yield the right of way to all manned aviation operations and activities at all times.
- 29) The UAS may not be operated by the PIC from any moving device or vehicle.
- 30) The UA may not be operated over congested or densely populated areas.

- 31) 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 and/or;
 - b) The aircraft is operated near vessels, vehicles or structures where the owner/controller of such vessels, vehicles or structures has granted permission 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, and
 - c) Operations nearer to the PIC, VO, operator trainees or essential persons do not present an undue hazard to those persons per § 91.119(a).
- 32) Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures. Operation may be conducted nearer than 500 feet to vessels, vehicles or structures only if the owner/controller of such vessels, vehicles or structures has granted permission and the PIC has made a safety assessment of the risk of operating nearer than 500 feet to those objects and determined that it does not present an undue hazard.
- 33) Operations nearer than 500 feet to the PIC, VO, operator trainees or essential persons as defined in the operating documents, are permitted only if those operations do not present an undue hazard to those persons per § 91.119(a) as determined by the PIC.
- 34) All operations shall be conducted over private or controlled-access property with permission from the land owner/controller or authorized representative. Permission from land owner/controller or authorized representative will be obtained for each flight to be conducted.
- 35) 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.

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 February 28, 2017, unless sooner superseded or rescinded.

Issued in Washington, DC, on February 18, 2015.

/s/

John Barbagallo

Acting Deputy Director, Flight Standards Service