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

Aviation Safety

800 Independence Ave

Washington, DC 20591

June 7, 2022

Exemption No. 19168
Regulatory Docket No. FAA-2022-0235

Ms. Kelly J. Neubecker
President
UASolutions Group, LLC
19940 Simla Hwy
Simla, CO 80835-9501

RE: Mr. Seth Arnold
Arnold Precision, LLC
301 E Main Street
Vanlue, Ohio 45890

Dear Ms. Neubecker:

This letter is to inform you that the Federal Aviation Administration (FAA) has granted your request for exemption. This letter transmits the FAA's decision, explains the FAA's basis, and provides the conditions and limitations of the exemption, including the date the exemption ends.

The Basis for the FAA's Decision

By letter dated February 17, 2022, you petitioned the FAA on behalf of Arnold Precision, LLC (Arnold) for an exemption from §§ 61.3(a)(1)(i), 91.7(a), 91.119(c), 91.121, 91.151(b), 91.403(b), 91.405(a), 91.407(a)(1), 91.409(a)(1), 91.409(a)(2), 91.417(a), 91.417(b), 137.19(c), 137.19(d), 137.19(e)(2)(ii), 137.19(e)(2)(iii), 137.19(e)(2)(v), 137.31, 137.33, 137.41(c), and 137.42 of Title 14, Code of Federal Regulations (14 CFR) to the extent necessary to allow Arnold to operate the DJI Agras T30 unmanned aircraft system (UAS), weighing over 55 pounds (lbs.) but no more than 171.96 lbs., closer than 500 feet from vessels, vehicles and structures for various agricultural operations and noxious weed and vegetation control.

The DJI Agras T30 does not currently have an airworthiness certificate. Title 49 U.S.C. § 44807 provides the Secretary of Transportation (hereinafter Secretary) with authority to determine whether a certificate of waiver, certificate of authorization, or a certificate under Section 44703 or Section 44704, is required for the operation of certain UAS. Section 44807(b) instructs the Secretary to base their determination on which types of UAS do not create a hazard to users of the National Airspace System (NAS) or the public. In making this determination, the Secretary must consider the size, weight, speed, operational capability of the UAS, and other aspects of the proposed operation. In accordance with the statutory criteria provided in 49 U.S.C. § 44807, and in consideration of the size, weight, speed, and operational capability, proximity to airports and populated areas, and specific operations, the Secretary has determined this aircraft does not create a hazard to users of the NAS or the public.

The FAA has issued a grant of exemption in circumstances similar in all material respects to those presented in your petition. In Grant of Exemption Nos. 18009 and 18413A (copies enclosed), the FAA found that a grant of exemption was in the public interest, and that the proposed operations' UAS safety features and the limitations under which the petitioner would operate were sufficient mitigations that ensured the proposed agricultural operations would not adversely affect safety.

Having reviewed your reasons for requesting an exemption, the FAA finds that:

- They are similar in all material respects to relief previously requested in the enclosed Grant of Exemption No. 18009 and Grant of Exemption No. 18413A;
- The reasons stated by the FAA for granting the enclosed Grant of Exemption No. 18009 and Grant of Exemption No. 18413A also apply to the situation you present;
- Grant of Exemption No. 18009 contains the FAA analysis for the relief granted from 14 CFR §§ 61.3(a)(1)(i), 91.7(a), 91.121, 91.151(b), 91.405(a), 91.407(a)(1), 91.409(a)(1), 91.409(a)(2), 91.417(a), 91.417(b), 137.19(c), 137.19(d), 137.19 (e)(2)(ii), 137.19 (e)(2)(iii), 137.19(e)(2)(v), 137.31, 137.33, 137.41(c), and 137.42;
- Grant of Exemption No. 18413A contains the FAA analysis for the relief granted from 14 CFR §§ 91.119(c) and 91.403(b); and
- A grant of exemption is in the public interest.

The FAA's Decision

The FAA has determined that good cause exists for not publishing a summary of the petition in the *Federal Register* because the requested exemption would not set a precedent, and any delay in acting on this petition would be detrimental to Arnold.

Under the authority contained in 49 U.S.C. §§ 106(f), 40113, 44701, and 44807**,** which the FAA Administrator has delegated to me, I hereby grant Arnold Precision, LLC an exemption from 14 CFR §§ 61.3(a)(1)(i), 91.7(a), 91.119(c), 91.121, 91.151(b), 91.403(b), 91.405(a), 91.407(a)(1), 91.409(a)(1), 91.409(a)(2), 91.417(a), 91.417(b), 137.19(c), 137.19(d), 137.19(e)(2)(ii), 137.19(e)(2)(iii), 137.19(e)(2)(v), 137.31, 137.33, 137.41(c), and 137.42 to the extent necessary to operate UAS weighing 55 lbs. or more to provide commercial agricultural-related services, subject to the conditions and limitations described below.

Conditions and Limitations

In this grant of exemption, Arnold Precision, LLC is hereinafter referred to as "the Operator" or "Exemption Holder."

1. Operations authorized by this grant of exemption include the DJI Agras T30 as described in the operating documents with a maximum take-off weight not to exceed 171.96 lbs., and are limited to agricultural aircraft operations. Additionally, the DJI Agras T30 aircraft must be listed on the Operator's Title 14, Code of Federal Regulations (14 CFR) Part 137 Letter of Authorization (LOA) prior to use in any Part 137 operation.

2. This exemption does not excuse the Operator from complying with Part 375. If operations under this exemption involve the use of foreign civil aircraft, the Operator must obtain a Foreign Aircraft Permit pursuant to 14 CFR § 375.41 before conducting any operations under this exemption. Application instructions are specified in 14 CFR § 375.43.

3. The DJI Agras T30 described in this exemption may not be operated at a groundspeed exceeding 30 miles per hour or at a speed greater than the maximum operating speed recommended by the aircraft manufacturer, whichever is lower.

4. All operations must be conducted in accordance with an Air Traffic Organization (ATO) issued Certificate of Waiver or Authorization (COA). A copy of the blanket 49 U.S.C. § 44807 COA is enclosed with this exemption. The Exemption Holder must apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the enclosed COA. If a conflict exists between the COA and this condition, the more restrictive provision will apply. The COA will also require the Operator to request a Notice to Air Missions (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to each operation. Unless the COA or other subsequently issued FAA authorization specifies an altitude restriction lower than 200 feet above ground level (AGL), operations under this exemption may not exceed 200 feet AGL. Altitude must be reported in feet AGL.

5. The pilot in command (PIC) must be designated before the flight and cannot transfer their designation for the duration of the flight. In all situations, the PIC is responsible for the safety of the operation. The PIC is also responsible for meeting all applicable conditions and limitations as prescribed in this exemption and ATO-issued COA, and operating in accordance with the operating documents. The aircraft must be operated within visual line of sight (VLOS) of the PIC at all times. The PIC must 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. The PIC may manipulate flight controls in the operation of no more than one unmanned aircraft at the same time. Proposed operation of more than one unmanned aircraft at the same time (by one PIC) requires a new petition or a petition to amend this exemption.

7. All operations must utilize the services of at least one or more visual observers (VO). The VO must be trained in accordance with the Operator's training program. For purposes of this condition, a VO is someone: (1) who maintains effective communication with the PIC at all times; (2) who the PIC ensures is able to see the unmanned aircraft with human vision as described in Condition and Limitation No. 5; and (3) coordinates with the PIC to scan the airspace where the unmanned aircraft (UA) is operating for any potential collision hazard and maintain awareness of the position of the UA through direct visual observation. The aircraft must be operated within VLOS of both the PIC and VO at all times. The operation must be conducted with a dedicated VO who has no collateral duties and is not the PIC during the flight. 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 VO must maintain visual sight of the aircraft at all times during flight operations without distraction. The PIC must ensure that the VO can perform the duties required of the VO. If either the PIC or a VO is unable to maintain VLOS with the UA during flight, the entire flight operation must be terminated as soon as practicable.

8. This exemption and all documents needed to operate the unmanned aircraft system (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 Exemption Holder's Flight Operations and Procedures Manual, Firmware Update Procedures, Emergency Procedures, Manufacturer's Manual for the DJI Agras T30, Maintenance Procedures Manual, all Preflight Checklists, and this Exemption and any ATO-issued COA that applies to operations under this exemption must be accessible during all UAS operations that occur under this exemption 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[1] to the Administrator or any law enforcement official upon request. The Operator must also present the most current documents if petitioning for extension of or amendment to this grant of exemption. If the Operator determines that any update or revision would affect the Operator's ability to comply with any requirement of this exemption, then the Operator must petition for an amendment to its grant of exemption. If questions arise regarding updates or revisions to the operating documents, the Operator may contact the Flight Standards Service General Aviation and Commercial Division (AFS-800), 800 Independence Ave. SW, Washington, DC 20591. Telephone: 202-267-1100, Email: 9-AFS-800-Correspondence@faa.gov.

9. Any aircraft 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 other personnel required to conduct the functional flight test (such as a mechanic or technician) 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.

10. The Operator is responsible for maintaining and inspecting all aircraft to be used in the operation and ensuring that they are all in a condition for safe operation.

11. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the aircraft is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, such as 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 aircraft is found to be in a condition for safe flight.

12. The Operator must follow the UAS manufacturer's operating limitations, maintenance instructions, service bulletins, overhaul, replacement, inspection, and life limit requirements for the DJI Agras T30 and its components. Each UAS operated under this exemption must comply with all manufacturers' safety bulletins. Maintenance must be performed by individuals who have been trained by the Operator in proper techniques and procedures for these UAS. All maintenance must be recorded in the aircraft records including a brief description of the work performed, date of completion and the name of the person performing the work.

[1] Updated documents should be sent to the FAA General Aviation and Commercial Division (AFS-800).

13. PIC Certification: Under this exemption, a PIC must hold a current remote pilot certificate.

14. The PIC must also hold at least a current FAA second-class airman medical certificate. The PIC may not conduct the operation if the PIC knows or has reason to know of any medical condition that would make the PIC unable to meet the requirements for at least a second-class medical certificate, or is taking medication or receiving treatment for a medical condition that results in the PIC being unable to meet the requirements for at least a second-class medical certificate. The VO or any other direct participant may not participate in the operation if they know or have reason to know of any physical or mental condition that would interfere with the safe operation of the aircraft.

15. The PIC must demonstrate the ability to safely operate the UAS in a manner consistent with how it will be operated under this exemption. The PIC must demonstrate the applicable knowledge and skills requirements for agricultural aircraft operations outlined in Part 137, evasive and emergency maneuvers, and maintaining appropriate distances from persons, vessels, vehicles and structures before operating non-training, proficiency, or experience-building flights under this exemption. Additionally, all PICs must satisfactorily complete the Operator's training program requirements, the completion of which must be documented. Furthermore, the PIC must satisfactorily demonstrate their ability to respond appropriately to a lost-link occurrence as part of the knowledge and skill assessment that will occur in accordance with 14 CFR § 137.19(e). PIC qualification flight hours and currency may be logged in a manner consistent with 14 CFR § 61.51(b). However, time logged for UAS operations may not be recorded in the same columns or categories as time accrued during manned flight, and UAS flight time does not count toward total flight time required for any Part 61 requirement.

16. All training operations must be conducted during dedicated training sessions and may not be conducted for compensation or hire. Furthermore, the PIC must operate the UA not closer than 500 feet to any nonparticipating person while conducting training operations.

17. 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). Operations may not be conducted under special visual flight rules (SVFR).

18. The aircraft 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.

19. For UAS operations where global positioning system (GPS) signal is necessary to safely operate the aircraft, the PIC must immediately recover or land the UA upon loss of GPS signal.

20. If the PIC loses command or control link, the aircraft must follow a pre-determined route to either reestablish link or immediately recover or land.

21. The PIC must abort the flight operation if unexpected circumstances or emergencies arise that could degrade the safety of persons or property. The PIC must terminate flight operations without causing undue hazard to persons or property in the air or on the ground.

22. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for each aircraft involved in the operation to conduct the intended operation with sufficient reserve such that in the event of an emergency, the PIC can land the aircraft in a known area without posing an undue risk to aircraft or people and property on the ground. In the alternative, if the manufacturer's manual, specifications, or other documents that apply to operation of the DJI Agras T30 recommend a specific volume of reserve power, the PIC must adhere to the manufacturer's recommendation, as long as it allows the aircraft to conduct the operation with sufficient reserve and maintain power to land the aircraft in a known area without presenting undue risks, should an emergency arise.

23. This exemption does not grant relief from the requirements concerning registration and marking of aircraft. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with Part 47, and have identification (N-Number) markings in accordance with Part 45, Subpart C. Markings must be as large as practicable.

24. Documents used by the Operator to ensure the safe operation and flight of the UAS and any documents required under 14 CFR §§ 91.9, 91.203, and 137.33 must be available to the PIC at the ground control station of the UAS any time any aircraft operates in accordance with this exemption. These documents must be made available to the Administrator or any law enforcement official upon request.

25. The UA must remain clear and give way to all manned aviation operations and activities at all times.

26. The UAS may not be operated by the PIC from any moving device or vehicle.

27. All flight operations must be conducted at least 500 feet from all persons who are not <u>directly</u> participating in the operation, and from vessels, vehicles, and structures, unless when operating:

    a. *Over or near people directly participating in the operation of the UAS.* No person may operate the UAS directly over a human being unless that human being is

directly participating in the operation of the UAS, to include the PIC, VO, and other personnel who are directly participating in the safe operation of the UA.

b. *Near nonparticipating persons.* Except as provided in subsection (a) of this section, a UA may only be operated closer than 500 feet to a person when barriers or structures are present that sufficiently protect that person from the UA and/or debris or hazardous materials such as fuel or chemicals in the event of an accident. Under these conditions, the Operator must ensure that the person remains under such protection for the duration of the operation. If a situation arises, in which the person leaves such protection and is within 500 feet of the UA, flight operations must cease immediately in a manner that does not cause undue hazard to persons.

c. *Closer than 500 feet from vessels, vehicles and structures.* The UA may be operated closer than 500 feet, but not less than 100 feet, from vessels, vehicles, and structures under the following conditions:
   (1) The UAS is equipped with an active geo-fence boundary, set no closer than 100 feet from applicable waterways, roadways, or structures;
   (2) The PIC must have a minimum of 7 hours' experience operating the specific make and model UAS authorized under this exemption, at least 3 hours of which must be acquired within the preceding 12 calendar months;
   (3) The PIC must have a minimum of 25 hours' experience as a PIC in dispensing agricultural materials or chemicals from a UA;
   (4) The UA may not be operated at a groundspeed exceeding 15 miles per hour;
   (5) The UA altitude may not exceed 20 feet AGL; and
   (6) The PIC must make a safety assessment of the risk of operating closer than 500 feet from those objects and determine that it does not present an undue hazard.

d. *Closer than 100 feet from vessels, vehicles and structures.* The UA may operate closer than 100 feet from vessels, vehicles, and structures in accordance with the conditions listed in 27.c. (2) through (6) and the following additional conditions:
   (1) The UAS is equipped with an active geo-fence boundary, set to avoid the applicable waterways, roadways, or structures; and
   (2) The Operator must obtain permission from a person with the legal authority over any vessels, vehicles or structures prior to conducting operations closer than 100 feet from those objects.

28. All operations shall be conducted from and over predetermined, uninhabited, segregated, private or controlled-access property as described in the Operator's Flight Operations Procedures Manual. The PIC must ensure the entire operational area will

be controlled[2] to reduce risk to persons and property on the ground, as well as other users of the NAS. This area of operation will include a defined lateral and vertical area where the aircraft will operate and must be geo-fenced to prevent any lateral and vertical excursions by the operating aircraft. Safety procedures must be established for persons, property and applicable airspace within the area of operation. A briefing must be conducted regarding the planned UAS operations prior to operation at each location of operation in which the Operator has not previously conducted agricultural aircraft operations. All personnel who will be performing duties within the boundaries of the area of operation must be present for this briefing. Additionally, all operations conducted under this exemption may only occur in areas of operation that have been physically examined by the Operator prior to conducting agricultural aircraft operations and in accordance with the associated COA.

29. 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 within 24 hours as required by the applicable COA issued by the FAA ATO. Additionally, any incident or accident that occurs, or any flight operation that transgresses the lateral or vertical boundaries of the operational work area, must be reported to the Flight Standards District Office (FSDO) that holds the Operator's Part 137 certificate.

Failure to comply with any of the above conditions and limitations may result in the immediate suspension or rescission of this exemption.

Unless otherwise specified in this grant of exemption, the UAS, PIC, and the Operator must comply with all applicable parts of 14 CFR including, but not limited to, Parts 45, 47, 91, and 137. In addition, the Operator must comply with all limitations and provisions of the Operator's agricultural aircraft operator certificate, which the Operator must obtain prior to conducting agricultural operations in accordance with 14 CFR § 137.11.

[2] The Operator will control access to minimize hazards to persons and property in the air and on the ground.

The Effect of the FAA's Decision

This exemption terminates on June 30, 2024, unless sooner superseded or rescinded.

To request an extension or amendment to this exemption, please submit your request by using the Regulatory Docket No. FAA-2022-0235 (*http://www.regulations.gov*). In addition, you should submit your request for extension or amendment no later than 120 days prior to the expiration listed above, or the date you need the amendment, respectively.

Any extension or amendment request must meet the requirements of 14 CFR § 11.81.

Sincerely,

/s/
Robert C. Carty
Deputy Executive Director, Flight Standards Service

Enclosures

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

Aviation Safety

800 Independence Ave
Washington, DC 20591

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In the matter of the petition of **POWERS FLIGHT GROUP** For an exemption from §§ 91.7(a); 91.119(c); 91.121; 91.151(b); 91.405(a); 91.407(a)(1); 91.409(a)(1) & (2); 91.417(a) & (b); 137.19(c)(d) & (e)(2)(ii)(iii) & (v); 137.31; 137.33; 137.41(c); & 137.42 of Title 14, Code of Federal Regulations	Exemption No 18009 Regulatory Docket No. FAA-2018-0574

GRANT OF EXEMPTION

By letters dated June 12, 2018, and June 19, 2018, Ms. Kelly J. Neubecker, Chief Executive Officer, UASolutions Group, Inc. (UASolutions), 5651 Talbot Blvd, Cocoa, FL 32926, petitioned the Federal Aviation Administration (FAA) on behalf of Powers Flight Group (Powers Flight) for an exemption from §§ 91.7(a), 91.119(c), 91.121, 91.151(b), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), 91.417(a) and (b), 137.19(c), (d) and (e)(2)(ii)(iii) and (v), 137.31, 137.33, 137.41(c), and 137.42 of Title 14, Code of Federal Regulations (14 CFR). The proposed exemption, if granted, would allow Powers Flight to operate the HSE-UAV AG V6A+ v2 unmanned aircraft system (UAS), weighing over 55 pounds (lbs.) but no more than 75.3 lbs., for controlled, low-risk, precision commercial agriculture-related services, including: multi-spectral crop analysis; ground moisture analysis; herbicide, pesticide and insecticide; aerial imagery; and 3D modeling in certain remote rural areas of the United States. The petitioner is also requesting relief to conduct the proposed operation, using UAS weighing more than 55 lbs., with a remote pilot certificate.

The petition for exemption describing the proposed operation and the regulations from which the petitioner seeks exemption is posted to the docket. To view the petition, visit

http://www.regulations.gov, enter the regulatory docket number found on the first page of this document into the search box, click "Search," then click on the "Open Docket Folder" link next to a result associated with the docket number.

The petitioner requests relief from the following regulations:

Section 91.7(a) prescribes that no person may operate a civil aircraft unless it is in an airworthy condition.

Section 91.119(c) prescribes, in pertinent part, that except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes 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 91.121 prescribes that –

(a) Each person operating an aircraft shall maintain the cruising altitude or flight level of that aircraft, as the case may be, by reference to an altimeter that is set, when operating—

(1) Below 18,000 feet MSL, to—

(i) The current reported altimeter setting of a station along the route and within 100 nautical miles of the aircraft;

(ii) If there is no station within the area prescribed in paragraph (a)(1)(i) of this section, the current reported altimeter setting of an appropriate available station; or

(iii) In the case of an aircraft not equipped with a radio, the elevation of the departure airport or an appropriate altimeter setting available before departure; or

(2) At or above 18,000 feet MSL, to 29.92″ Hg.

(b) The lowest usable flight level is determined by the atmospheric pressure in the area of operation.

(c) To convert minimum altitude prescribed under §§ 91.119 and 91.177 to the minimum flight level, the pilot shall take the flight level equivalent of the minimum altitude in feet and add the appropriate number of feet specified below, according to the current reported altimeter setting.

Section 91.151(b) prescribes that no person may begin a flight in a rotorcraft 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, to fly after that for at least 20 minutes.

Section 91.405(a) prescribes that each owner or operator of an aircraft shall have that aircraft inspected as prescribed in subpart E of part 91 and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43.

Section 91.407 prescribes that -

(a) No person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless—

(1) It has been approved for return to service by a person authorized under § 43.7 of this chapter[.]

Section 91.409 prescribes that -

(a) Except as provided in paragraph (c) of this section, no person may operate an aircraft unless, within the preceding 12 calendar months, it has had—

(1) An annual inspection in accordance with part 43 of this chapter and has been approved for return to service by a person authorized by § 43.7 of this chapter; or

(2) An inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.

No inspection performed under paragraph (b) of this section may be substituted for any inspection required by this paragraph unless it is performed by a person authorized to perform annual inspections and is entered as an "annual" inspection in the required maintenance records.

Section 137.19 prescribes, in pertinent part, that -

(c) Commercial operator—pilots. The applicant must have available the services of at least one person who holds a current U.S. commercial or airline transport pilot certificate and who is properly rated for the aircraft to be used. The applicant himself may be the person available.

(d) Aircraft. The applicant must have at least one certificated and airworthy aircraft, equipped for agricultural operation.

(e) Knowledge and skill tests. The applicant must show, or have the person who is designated as the chief supervisor of agricultural aircraft operations for him show, that he has satisfactory knowledge and skill regarding agricultural aircraft operations, as described in paragraphs (e) (1) and (2) of this section.

(2) The test of skill consists of the following maneuvers that must be shown in any of the aircraft specified in paragraph (d) of this section, and at that aircraft's maximum certificated take-off weight, or the maximum weight established for the special purpose load, whichever is greater:

(i) Short-field and soft-field takeoffs (airplanes and gyroplanes only).

(ii) Approaches to the working area.

(iii) Flare-outs.

(iv) Swath runs.

(v) Pullups and turnarounds.

(vi) Rapid deceleration (quick stops) in helicopters only

Section 137.31 prescribes that no person may operate an aircraft unless that aircraft—

(a) Meets the requirements of § 137.19(d); and

(b) Is equipped with a suitable and properly installed shoulder harness for use by each pilot.

Section 137.33 prescribes that –
(a) No person may operate an aircraft unless a facsimile of the agricultural aircraft operator certificate, under which the operation is conducted, is carried on that aircraft. The facsimile shall be presented for inspection upon the request of the Administrator or any Federal, State, or local law enforcement officer.
(b) Notwithstanding part 91 of this chapter, the registration and airworthiness certificates issued for the aircraft need not be carried in the aircraft. However, when those certificates are not carried in the aircraft they shall be kept available for inspection at the base from which the dispensing operation is conducted.

Section 137.41 prescribes, in pertinent part, that –
(c) Pilot in command. No person may act as pilot in command of an aircraft unless he holds a pilot certificate and rating prescribed by § 137.19(b) or (c), as appropriate to the type of operation conducted. In addition, he must demonstrate to the holder of the Agricultural Aircraft Operator Certificate conducting the operation that he has met the knowledge and skill requirements of § 137.19(e). If the holder of that certificate has designated a person under § 137.19(e) to supervise his agricultural aircraft operations the demonstration must be made to the person so designated. However, a demonstration of the knowledge and skill requirement is not necessary for any pilot in command who—

(1) Is, at the time of the filing of an application by an agricultural aircraft operator, working as a pilot in command for that operator; and
(2) Has a record of operation under that applicant that does not disclose any question regarding the safety of his flight operations or his competence in dispensing agricultural materials or chemicals.

Section 137.42 prescribes that no person may operate an aircraft in operations required to be conducted under part 137 without a safety belt and shoulder harness properly secured about that person except that the shoulder harness need not be fastened if that person would be unable to perform required duties with the shoulder harness fastened.

The petitioner supports its request with the following information:

The petitioner provided the following information along with its petition to support its request for an exemption, which includes proprietary and/or confidential supporting documents.

1) Powers Flight Group AG-Brochure
2) Powers Flight Group AG-VA Manual
3) Powers Flight Group M6A Pro Testing Report
4) Powers Flight Group ALPA Answers
5) Powers Flight Group Flight Operations Procedures Manual (FOPM)

6) Powers Flight SMS
7) Powers Flight Group Aircrew Training Manual

The petition for exemption and documents listed above are hereinafter collectively referred to as the operating documents. This exemption is limited to the HSE-UAV AG V6A+ v2 unmanned aircraft (UA). The HSE-UAV AG V6A+ v2 is a six-rotor UAS with a maximum operational weight of 75.3 lbs. The FAA has considered carefully the UAS that the petitioner intends to operate under this exemption.

The HSE-UAV AG V6A has logged more than 8,760 hours of testing since its inception by the TT Aviation Technology Co., Ltd. Additional testing has been performed by Beijing University of Aeronautics & Astronautics as well as the National Plant Protection, machinery quality supervision and inspection center. There are currently over 1,287 of the HSE-UAV AG V6A sold globally on an annual basis with an estimated 1,624,280 hours flown safely by customers worldwide. The HSE-UAV AG V6A+ has operated successfully in extreme weather conditions to include high winds and a variety of terrains. the aircraft only encountered two failures.

Discussion of Public Comments:

A summary of the petition was published in the *Federal Register* on September 14, 2018, FAA-2018-0574 (83 FR 46774). The FAA received three comments from the Airline Pilots Association International (ALPA), FAA-2018-0574-0006; the National Agricultural Aviation Association (NAAA), FAA-2018-0574-0007; and the Small UAV Coalition, FAA-2018-0574-0008.[1] The Small UAV Coalition encouraged the FAA to grant the petition, as permitting the oeprations would be in the public interest and the petition included several proposed risk mitigation measures. In addition, the Small UAV Coalition mentioned the safety record of the HSE-UAV AG V6A+ v2, which was previously named the Bejing TT Aviation Technology Co. Lt. M6A Pro.

[1] These comments are available at www.regulations.gov, by searching the associated document numbers listed.

ALPA expressed concerns with the petitioner's proposed operations of the UAS. In particular, ALPA stated a pilot acting as pilot in command for a UAS who does not hold a commercial pilot certificate that weigh "as much as 75.3 pounds," significantly increases the operational risk. ALPA stated it could not support a favorable disposition of the petition in the absence of "further understanding and assurances of mitigating measures," and the lack of detailed information provided by the petitioner In particular, ALPA stated the petition does not offer a means to control the airspace or areas of operations to ensure the aircraft do not present a hazard to other aircraft that could intrude on the operation. ALPA also stated the petition fails to state clearly how one pilot and one visual observer (VO) can safely communicate with one another effectively by voice. ALPA also expressed concern about lithium-ion and lithium-ion polymer battery cells, stating the FAA must address the safe carriage of batteries and mitigations for the risks they present. Additionally, ALPA expressed concern the petitioner does not define "controlled" or "limited in scope" nor does it offer a means to control the airspace or areas of operations. ALPA further stated the petition does not provide a credible explanation for how the unmanned aircraft would be able to respond safely in the event of a lost-link scenario. Finally, ALPA listed all regulations that are the subject of the petition, and either recommended the FAA refrain from granting relief from an applicable regulation or suggested requirements to reach a level of safety equivalent to the level the regulation provides. ALPA did not refer to a specific model UAS.

The FAA recognizes the concerns ALPA and NAAA expressed, and has incorporated associated conditions and limitations into this exemption, including: issuance of a Notice to Airman (NOTAM) issued for all operations; requiring operations be conducted within VLOS of the pilot in command (PIC) and the VO; and requiring the UAS PIC always to yield right-of-way to manned aircraft. Additionally, the FAA developed additional conditions and limitations designed to mitigate certain aspects of the petitioner's operation. Examples include a requirement for a separate VO for each unmanned aircraft during flight operations, altitude limits of 200 feet above ground level, a speed restriction of 30 miles per hour, and FAA observation of PIC knowledge and skills required by 14 CFR § 137.19(e). In addition, this exemption requires the petitioner to obtain an Agricultural Aircraft Operator Certificate under 14 CFR § 137.11 and list the HSE-UAV AG V6A+ v2 unmanned aircraft on the letter of authorization that will accompany the certificate.

As discussed later in detail, the limitations under which the petitioner will operate the UAS, combined with the design features, risk mitigation measures described in the operating documents, and the provisions of the FAA-required Certificate of Waiver or Authorization (COA) relevant to the mitigation measures to address the risks the proposed operations present. As a result, the FAA concludes the operations the petitioner proposes will not adversely affect safety.

As discussed later, safely enabling new uses for unmanned aircraft and reducing exposure to safety risk through unmanned operations is in the public interest. The FAA has considered carefully ALPA's concerns regarding the petitioner's lack of identified operational locations. As described above, this exemption contains conditions and limitations that the FAA has

designed to mitigate the risks that could occur as a result of the proposed operations. The FAA has concluded the public interest in permitting the operations described in detail in the operating documents outweighs the concerns ALPA expressed concerning operational locations and FAA oversight.

The FAA's analysis is as follows:

The FAA has analyzed five key aspects of the petition for exemption: (1) the UAS, (2) the UAS pilot in command (PIC), (3) the UAS operating parameters, (4) the part 137 operating certificate, and (5) the public interest. In accordance with the statutory criteria provided at 49 U.S.C. 44807,[2] operations of this aircraft in accordance with the conditions and limitations listed herein would not create a hazard to users of the national airspace system (NAS) or the public. The size, method of operation, and very low operating speed of the HSE-UAV AG V6A+ v2, in conjunction with the terms of this exemption, would provide a level of safety at least equal to that provided by the rules from which the petitioner will be exempt. A review of the data supplied to the FAA during its evaluation supports this finding.

UAS

The petitioner submitted numerous documents in support of its petition, several of which were confidential. Such documents included the HSE-UAV AG V6A+ v2 Aircrew Training and Procedures Program, UAS Testing Report from the Agricultural Department, Manufacturers' Manuals for the HSE-UAV AG V6A+ v2, UAS Flight Operations and Procedures Manual (FOPM) containing maintenance procedures preflight checklists, crew resource management, emergency procedures, and medical considerations. Additional documents included a comprehensive Safety Management System Manual containing a detailed risk assessment analysis for the specific operations. The FAA also carefully analyzed the data concerning the proposed agricultural operations provided by the petitioner. Such data included information concerning the lost link safety system, altitude and Global Positioning System (GPS) control, terrain-following software, and the emergency brake system which stops the UA travel and hovers until commanded otherwise. Additionally, the FAA examined related warning systems, the reliability and functionality including component interface, structural integrity, and software development processes that included revision control. Further, the FAA reviewed a historical component-level comparison of the HSE-UAV AG V6A+ v2.

The petitioner's proposed operation utilizing the HSE-UAV AG V6A+ v2 with the Pixhawk2 flight controller, rotor fail protection, emergency brake and return-to launch (RTL) function, geo-fencing, locating beacon, redundant GPS system, and telemetry link with radio control control provides a safe, reliable platform from which to spray. Some additional safety features include the "Full Black Box / Flight Recording" of all flights in which flight data shows a

[2] Petitioner requested an exemption to operate the HSE-UAV AG U6A+ v2 under Public Law 112-95 § 333 (Feb. 14, 2012). Title 49 U.S.C. 44807 replaced section 333 on October 5, 2018. As a result, the FAA has considered the proposed operations, and issues this exemption, based on the authority provided at § 44807.

real-time video of all operator control input, GPS statuses, vibrate, shake and motor balance statuses along with battery voltage and all other critical telemetry data allowing operator to fully track the entire history. All flights are automatically saved on the GCS. This further adds to safety for operator and visual observer (VO) training as operator-caused issues can be quickly identified. Further, it allows for remote diagnostics and has a financial benefit of not requiring aircraft and components to be unnecessarily replaced.

The FAA has determined that the in-depth review of the UAS, the proposed operations' UAS safety features, as noted above, and the limitations under which the petitioner would operate are sufficient mitigations that ensure the proposed agricultural operations would not adversely affect safety. As previously mentioned the HSE-UAV AG V6A+ encounterd only two failures, one barometer inaccuracy - caused aircraft to initiate slow descent, no injury or damage resulted. Solution - replaced barometer. Two, magnetic compass failure - redundant system activated, no injuries or damage occurred. Solution - replaced defective Magnetic Compass. This grant of exemption contains conditions and limitations which mitigate safety concerns related to replacing parts and conducting test flights after maintenance is performed prior to conducting operations. The aircraft performed well in extreme altitudes and high winds, as it exhibited no loss of communications, no issues with stability, or control and handling. Performance of all safety features work as designed.

In particular, the operations would occur within the visual line of sight (VLOS) of the pilot in command (PIC) along with a VO assigned to observe the UA being flown. Moreover, operations would be limited 200 feet above ground level (AGL) or below during daytime hours. Lastly, the petitioner would consistently adhere to the requirement to have all PICs undergo a knowledge and skill assessment in accordance with § 137.19, as well as all other requirements of the applicable sections of 14 CFR part 137 (Agricultural Aircraft Operations).

The FAA considered risk-mitigating factors such as the historical component-level comparison of the UA, the petitioner's extensive agricultural aircraft operating experience with the HSE-UAV AG V6A+ v2, pilot and VO training requirements, system safety features, the intended low-altitude and remote area of operations, and other operating limitations.

The HSE-UAV AG V6A+ v2 has onboard safety features to ensure the UAS can operate safely under both normal and contingency operating conditions. HSE has been manufacturing and tracking reliability of the HSE-UAV AG V6A+ v2 and similar models since 2009. In support of the manufacturer's quality control program, the petitioner provided entrustment inspections from Beijing TT Aviation Technology Co., Ltd., and the Beihang University, Advanced Flight Control Technology Lab. Additionally, as required by § 137.19(e), *Knowledge and Skill Tests*, the petitioner will have to satisfactorily demonstrate lost-link procedures with the UA for FAA Aviation Safety Inspectors (ASIs). These safety features ensure that these operations would not adversely impact safety compared to a manned aircraft performing a similar operation and address the risk of command and control link failures.

The petitioner requested relief from §§ 91.405(a), *Maintenance required*, 91.407(a)(1), *Operation after maintenance, preventive maintenance, rebuilding, or alteration*, 91.409(a)(1)(2), *Inspections*, and 91.417(a) and (b), *Maintenance records*.

The FAA bases its determination to grant exemption from the requirements of §§ 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b) on the fact that the petitioner has a documented history of active quality control including the identification and correction of procedural deviations and mechanical anomalies, including necessary design changes, to improve system reliability. The documents the petitioner submitted to the FAA provide details concerning these aspects. For example, the petitioner included information regarding its review, analysis and risk assessment of a hard landing. No injuries or significant damage resulted from the incident. The petitioner's report includes details of the incident and the corrective actions taken to mitigate future occurrences. Based on this information, the FAA concludes it is unlikely another such incident would occur. The FAA has considered these factors in its evaluation of the petition and determined that adherence to the conditions and limitations below regarding the responsibilities for maintaining, periodically inspecting, and conducting pre-flight inspections of the aircraft described in this exemption are sufficient to ensure operations under this exemption would not adversely affect safety. Therefore, the FAA finds that exemption from §§ 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2),[3] and 91.417(a) and (b) is appropriate, as long as the petitioner adheres to the conditions and limitations below.

Overall, the FAA has determined the safety of the operations of the HSE-UAV AG V6A+ v2 is addressed by the petitioner and the FAA within the conditions and limitations below including: limited flight time while spraying, low operating altitude, reduced airspeed, issuance of a NOTAM prior to each flight, and that all operations will require a certificate of waiver or authorization (COA) from the FAA Air Traffic Organization limiting the operational area.

<u>UAS PIC</u>

The petitioner proposes to operate the HSE-UAV AG V6A+ v2 with a pilot in command holding a remote pilot certificate under part 107. In proposing and codifying part 107, the FAA carefully analyzed the unique PIC requirements appropriate for operations of UAS.

While the petitioner did not request relief from § 61.3, the FAA has determined such relief is appropriate. Section 61.3 states as follows:

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[3] Section 91.409(a) requires *either* an annual inspection *or* an inspection for the issuance of an airworthiness certificate. The petitioner requests relief from § 91.409(a)(1)(2) (requiring an annual inspection in accordance with 14 CFR part 43, and inspection prior to receiving an airworthiness certificate under 14 CFR part 21). The FAA grants relief to the petitioner from both § 91.409(a)(1) and (a)(2). As such, this relief will allow for operations of the HSE-UAV AG V6A+ v2 to continue past the 12 calendar months from which the petitioner receives relief from § 91.409(a).

> No person may serve as a required pilot flight crew member of a civil aircraft of the United States unless that person:
> (1) has in the person's physical possession or readily accessible in the aircraft when exercising the privileges of that pilot certificate or authorization –
> (i) a pilot certificate issued under this part.

The petitioner would conduct the proposed operations under part 91, rather than under part 107. In general, part 91 is predicated on the presumption that the pilot in command conducting an operation under part 91 holds an airman certificate under part 61. As a result, the FAA has determined granting exemption from the requirement of § 61.3(a)(1)(i) to require a person holding a remote pilot in command certificate (with the appropriate training and demonstration of knowledge and skills required by this exemption) to conduct the operations to which this exemption applies will ensure clarity.

The statutory obligation for an airman certificate is codified at 49 U.S.C. § 44711(a)(2). Pilots who conduct operations under this exemption with a remote pilot in command certificate would comply with § 44711(a)(2), as described in the *Operation and Certification of Small Unmanned Aircraft Systems* final rule.[4] The general requirements for all airmen include: eligibility, aeronautical knowledge and Transportation Security Administration (TSA) vetting. Given that the operation would occur only after airmen who hold a current remote pilot in command certificate have received specific training, have visited the area of operation and are fully capable of using the tools available to prepare for the operation, conduct comprehensive preflight actions, and conduct the operation only in a limited controlled area, the FAA has determined that a remote pilot certificate issued under part 107 provides the FAA sufficient assurance of the pilots' qualifications and abilities to perform the duties related to the operations authorized under this exemption. The remote pilot in command certificate confirms the petitioner's eligibility, secures TSA vetting, and ensures the PIC has the requisite aeronautical knowledge for operating the UAS within the NAS.

Remote pilots conducting operations under part 107 must complete a detailed aeronautical knowledge test, unless they already hold a certificate under part 61 and meet the flight review requirements specified in § 61.56.[5] As a result, all such pilots will have the requisite aeronautical knowledge that is a key component of safe completion of all operations that will occur under this exemption. In this regard, the FAA addressed the applicable parts of § 61.125, *Aeronautical knowledge*, in the remote pilot in command certificate requirements. Examples include basic aerodynamics, principles of meteorology, weight and balance, decision-making, and emergency operations. Other requirements that are specific to agricultural aircraft operations that occur under part 137 as explained below in

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[4] 81 FR 42064, 42088-89 (June 28, 2016).
[5] 14 CFR § 107.65(c).

this exemption, would apply to all remote pilots who conduct operations under this exemption.[6]

The FAA bases its decision to require holders of a remote pilot in command certificate to complete operations under this exemption on the fact that the petitioner would consistently engage in comprehensive pilot and VO training, and certification requirements. These requirements include pre-hire interview and screening, logbook review and reference checks, skills test, and a comprehensive training course tailored for the proposed operations that includes theory and practical components, a pilot theory exam, and supervised operational familiarization training on agricultural spraying. Additionally, completion of Powers Flight Group's training program requirements includes examination, flight test, and continued periodic training even after certification to include specific upgrade training for a PIC prior to being allowed to oversee flight operations.

Based on the specific requirements imposed by the remote pilot in command certificate, the petitioner's hiring, training and testing protocols, the knowledge and skill requirements in § 137.19, the remote, controlled locations and extremely low-altitude operating environment, the FAA concludes pilots who hold a remote pilot in command certificate can safely conduct the proposed operations. In this regard, all pilots conducting operations under this exemption must hold a current remote pilot in command certificate pursuant to § 107.12 and maintain currency per § 107.65 while operating the UAS to which this exemption applies. As a result, the FAA has determined that the conduct of the operation by pilots holding remote pilot in command certificates would not adversely affect safety.

Manned agricultural operations under part 137 typically would require a second-class medical certificate. Due to the nature of the proposed operations, the FAA has determined maintaining a medical certificate ensures the pilot does not have any physical or mental condition that would interfere with the safe operation of the UAS. Accordingly, for operations under this exemption, the PIC must hold at least a second-class medical certificate. Additionally, PICs of operations under this exemption are prohibited from operations during medical deficiency as prescribed in § 61.53(a), and VOs and other direct participants of operations under this exemption are prohibited from operations during medical deficiency as prescribed in § 61.56(b).

UAS Operating Parameters

The petitioner's operating documents describe operational procedures and limitations developed for the HSE-UAV AG V6A+ v2 for operations that involve a single UAS. These documents describe specific protocols to mitigate potential safety risks to persons and property. For example, the petitioner's Operations Manual includes flying procedures, pre-

[6] The knowledge and skill assessment under part 137 ensures awareness of aircraft performance and includes a demonstration of pilot skills through specific flight maneuvers observed by FAA Aviation Inspectors, required by § 137.19, *Certification requirements*.

and post-flight procedures, maintenance information, and other detailed information concerning the HSE-UAV AG V6A+ v2. Additionally, the petitioner states they have the ability to program, calibrate, debug, and modify flight controller information without power to rotors, thus allowing safe physical interaction with the UA while performing maintenance and servicing.

The FAA also carefully considered the preflight actions the pilots and visual observers would take prior to every operation under this exemption. Such actions include reviewing weather, flight battery requirements, landings, and takeoff distances and aircraft performance data before initiation of flight. The operations must comply with visibility requirements and adherence to minimum distances from clouds. Such requirements ensure the unmanned aircraft does not operate so close to a cloud as to create a hazard to other aircraft operating in the NAS. The FAA also notes the risks associated with sun glare; the FAA concludes that pilots' and visual observers' ability to still see other air traffic, combined with the pilots' skill in determining when to initiate a return-to-home sequence, are important risk-mitigation measures. The pilot in command would also account for all relevant site-specific conditions in his or her preflight procedures. The FAA considered these procedures and limitations in determining the proposed operations can be conducted safely.

The petitioner has requested relief from § 91.7(a), *Civil aircraft airworthiness*. While the petitioner's UAS will not require an airworthiness certificate as described in 49 U.S.C. § 44807, the FAA has determined that for the purposes of this exemption, the pilot's determination prior to each flight that the unmanned aircraft are in a condition for safe operation is a principal component of the risk mitigation scheme that ensures safety of the operations under this exemption. Section 91.7(b) will continue to apply, as it requires the pilot in command maintain the responsibility of determining whether the aircraft is in a condition for safe flight. Therefore, relief from § 91.7(a) is appropriate to permit operations of the UAS in the absence of an airworthiness certificate. .

Regarding the petitioner's requested relief from § 91.119(c), *Minimum safe altitudes: General*, the petitioner states that the HSE-UAV AG V6A+ v2 would be operated at altitudes below 500 feet AGL and closer than 500 feet to persons, primarily the PIC and VO, although the PIC and VO would always maintain a safe distance from the UA as required by the operating documents. Regarding this request for relief, the FAA finds that relief from § 91.119(c) is necessary because the aircraft would be operated at altitudes below 500 feet AGL. Section 91.119(c) states that no person may operate an aircraft below the following altitudes: *over other than congested areas*, an altitude of 500 feet above the surface, except over open water or sparsely populated areas. The FAA finds relief from § 91.119(c) to permit operations below the required altitude in accordance with this exemption would not adversely affect safety because the petitioner will comply with the conditions and limitations in this exemption.

This exemption does not permit operations within 500 feet of people or over people not participating in the operation unless barriers or structures are present that sufficiently protect

those persons from the unmanned aircraft or debris or hazardous materials such as fuel or chemicals in the event of an accident. Under these conditions, the operator must ensure these nonparticipating persons remain under such protection for the duration of the operation.[7] If a situation arises in which nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner that does not cause undue hazard to persons.

Regarding the petitioner's requested relief from § 91.121, *Altimeter settings*, when the UA is not equipped with a barometric altimeter, an alternative means for measuring and reporting UA altitude is necessary, such as GPS. As stated in the conditions and limitations below, the FAA requires altitude be reported in feet AGL. The petitioner may choose to set the altitude indicator to zero feet AGL rather than local barometric pressure or field altitude before flight. Given the limited altitude of the proposed operations, relief from § 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(b), *Fuel requirements for flight in VFR conditions*, prior UAS-specific relief has been granted in Exemption Nos. 8811, 10808, and 10673 for daytime, Visual Flight Rules (VFR) conditions. The conditions and limitations below prohibit the pilot in command from beginning a flight unless (considering wind and forecast weather conditions) there is enough available fuel for the UAS to operate for the intended operational time with sufficient reserve such that in the event of an unplanned emergency, the PIC can land the aircraft in a known area, without posing an undue risk to aircraft or people and property on the ground, or with the reserve fuel recommended by the manufacturer if greater. Because the conditions and limitations of this exemption will require such a comprehensive preflight verification, the FAA finds that compliance with these conditions and limitations ensures that the operations under this exemption achieve the necessary level of safety that compliance with § 91.151(b) provides.

Part 137 Operating Certificate

The petitioner requested relief from the following sections of part 137, Agricultural Aircraft Operations: §§ 137.19(c), (d), and (e)(2)(ii), (iii) and (v), 137.31, 137.33, 137.41(c), and 137.42. This exemption grants authorization for use of the HSE-UAV AG V6A+ v2 for dispensing of economic poisons and other agricultural aircraft operations in accordance with part 137. For purposes of this exemption, an economic poison is (1) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any insects, rodents, nematodes, fungi, weeds, or other forms of plant or animal life or viruses, except viruses on or in living man or other animals, which the Secretary of Agriculture shall declare to be a pest; and (2) any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant, § 137.3.

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[7] As in Exemption No. 13465A, Kansas State University, the petitioner may allow the unmanned aircraft to fly over people who are directly participating in the operation of the unmanned aircraft such as the pilot in command and the visual observer.

The petitioner must contact the FAA jurisdictional Flight Standards District Office (FSDO) or Certificate Management Office (CMO) to add the HSE-UAV AG V6A+ v2 UAS to the agricultural aircraft operator Aircraft Authorization List, paragraph A003[8], issued under part 137, in order to conduct agricultural aircraft operations in the NAS in accordance with this exemption.

The petitioner requested relief from § 137.19(c), *Certification requirements*, which requires the applicant for a commercial agricultural aircraft operator certificate to have available the services of at least one person who holds a current U.S. commercial or airline transport pilot certificate and who is properly rated for the aircraft to be used. The petitioner, however, requests relief from this requirement to permit pilots who hold a remote pilot in command certificate to conduct commercial agricultural aircraft operations under part 137. The FAA has determined that relief from § 137.19(c) will be necessary to permit persons holding a remote pilot certificate to act as pilot in command for agricultural aircraft operations under this exemption. The FAA's basis for this relief is consistent with the discussion in the UAS PIC section above. All pilots in command who seek to conduct operations under this exemption must comply with the additional knowledge and applicable skill requirements in part 137 as well as the petitioner's training requirements in the operating documents. Lastly, due to the relief provided from § 137.19(c), the FAA also provides relief from the pilot certificate requirements of § 137.41(c), *Personnel*, as § 137.41(c) prohibits any person from acting as pilot in command of an aircraft unless that person holds a pilot certificate and rating prescribed by § 137.19(b) or (c), as appropriate for the type of operation conducted. Section 137.41(c) further requires the pilot in command to fulfill the knowledge and skill requirements of § 137.19(e). The FAA grants relief to the petitioner from § 137.41(c) to the extent necessary to require a remote pilot in command certificate for operations under this exemption.

Regarding the requested relief from §§ 137.19(d), *Certification requirements*, and 137.31(a), *Aircraft requirements*, as stated in the analysis above and consistent with the Secretary's determination that airworthiness certification is not necessary for the HSE-UAV AG V6A+ v2, the FAA finds that relief from §§ 137.19(d) and 137.31(a) would not adversely affect safety, given that the petitioner would comply with all conditions and limitations set forth below. In reaching this determination, the FAA considered Powers Flight Group's safe operating history in agricultural aircraft operations and the design of the HSE-UAV AG V6A+ v2, which has components to ensure the operations do not adversely affect safety. Although relief from the requirement for the airworthiness certification is granted, the aircraft must be in a condition for safe flight in accordance with § 91.7(b). Moreover, the petitioner must maintain an agricultural aircraft operator certificate under § 137.11 before conducting any aerial application operation.

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[8] Letter of Authorization permitting use of specific aircraft for agricultural aircraft operations issued by the FAA using the Web-Based Operations Safety System (WebOPSS).

Regarding the requested relief from § 137.19(e)(2)(ii), (iii), and (v), *Certification requirements*, the FAA has determined that demonstration of the skill described in these paragraphs is not necessary because they are not compatible with the operation of the HSE-UAV AG V6A+ v2 during agricultural aircraft operations as described in the petitioner's operating documents. Powers Flight Group's UAS training and certification program would provide pilots in command with the necessary skills to operate the HSE-UAV AG V6A+ v2 safely in agricultural aircraft operations. Granting relief from a demonstration of the skills described in § 137.19(e)(2)(ii), (iii), and (v) does not adversely impact safety because the operations of the HSE-UAV AG V6A+ v2 under this exemption would not include any exercise of those maneuvers. Pilots in command must demonstrate all other skill requirements in § 137.19(e)(2) not exempted herein to the satisfaction of the Administrator, as required for certification as an agricultural aircraft operator under part 137. If the operating procedures of the petitioner's aircraft ever change to require the pilot in command to perform any skill or maneuver described in § 137.19(e)(2)(ii), (iii), and (v), Powers Flight Group must petition for amendment to this grant. Lastly, due to the relief provided from § 137.19(e)(2)(ii), (iii), and (v), the FAA also grants relief from those portions of the associated knowledge and skill test requirements of § 137.41(c).

Regarding the petitioner's requested relief from § 137.31(b), *Aircraft requirements*, and § 137.42, *Fastening of safety belts and shoulder harnesses*, the FAA finds that an exemption from these requirements related to the installation and use of a shoulder harness and safety belt is warranted because the HSE-UAV AG V6A+ v2 are unmanned aircraft with no onboard pilot. These requirements are intended to ensure the safety of the onboard pilot during manned agricultural aircraft operations. The HSE-UAV AG V6A+ v2 will not have onboard pilots. Relief from §§ 137.31(b) and 137.42 in this exemption, therefore, does not adversely affect the safety of operations of the petitioner's aircraft.

The petitioner requests relief from § 137.33, *Carrying of certificate*, which requires that a facsimile of the agricultural aircraft operator certificate be carried on the aircraft. Given that the HSE-UAV AG V6A+ v2 are unmanned, the FAA has determined providing relief from this requirement achieves the objective of § 137.33(a) and therefore reaches an equivalent level of safety, as long as the operator maintains all necessary documents at the ground control station. In this regard, the conditions and limitations below require the pilot in command to keep the operator certificate at the ground control station and accessible to the pilot in command at all times. Because this exemption permits operation of the HSE-UAV AG V6A+ v2 in the absence of an airworthiness certificate, the FAA also grants relief from the requirement of § 137.33(b), to the extent that section requires keeping the airworthiness certificate available for inspection.

Public Interest

The FAA finds that a grant of exemption is in the public interest. The enhanced safety achieved using the HSE-UAV AG V6A+ v2 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. Manned aircraft conducting agricultural operations can weigh thousands of pounds and carry hundreds of gallons of fuel and payload. The HSE-UAV AG V6A+ v2 weighs much less than other UAS approved for similar applications and carries no flammable onboard fuel. In contrast, manned aircraft are operated by an onboard pilot and may carry other onboard crewmembers. The pilot and crew will be remotely located from the aircraft and will remain outside a designated safety zone when the HSE-UAV AG V6A+ v2 are operating, ensuring that the pilot and observer are never so close as to pose a hazard to the crew. The risk to an onboard pilot and crew during an incident or accident is eliminated with the use of a UAS for the proposed operation. Furthermore, the petitioner's UAS carry no fuel and would impact the surface with much less energy than a manned aircraft and therefore lower the potential risk and severity of fire following an incident or accident due to fuel or payload spillage.

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

Relief considered (14 CFR §)	**FAA determination**
61.3(a)(1)(i)	Relief granted with conditions and limitations
91.7(a)	Relief granted with conditions and limitations
91.119(c)	Relief granted with conditions and limitations
91.121	Relief granted with conditions and limitations
91.151(b)	Relief granted with conditions and limitations
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
137.19(c), (d), and (e)(2)(ii), (iii), and (v)	Relief granted with conditions and limitations
137.31	Relief granted
137.33	Relief granted with conditions and limitations
137.41(c)	Relief granted with conditions and limitations
137.42	Relief granted

Additionally, as required in the conditions and limitation below, the petitioner's agricultural aircraft operator certificate indicates the HSE-UAV AG V6A+ v2 may meet the definition of a foreign civil aircraft. Before conducting operations under this exemption, therefore, the petitioner may have to obtain a Foreign Aircraft Permit pursuant to 14 CFR § 375.41, if 14 CFR part 375 applies to the operations permitted in this exemption. This exemption does not waive or exempt any requirement of part 375.

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, Powers Flight Group is granted an exemption from 14 CFR §§ 61.3(a)(1)(i); 91.7(a); 91.119(c); 91.121; 91.151(b); 91.405(a); 91.407(a)(1); 91.409(a)(1) and (2); 91.417(a) and (b); 137.19(c) and (d); 137.19(e)(2)(ii), (iii) and (v); 137.31; 137.33; 137.41(c); and 137.42 to the extent necessary to allow the petitioner to operate the HSE-UAV AG V6A+ v2 UAS for the purpose of agricultural aircraft related services operations. This exemption is subject to compliance with the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, Powers Flight Group is hereinafter referred to as the operator or exemption holder.

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 include the HSE-UAV AG V6A+ v2 as described in the operating documents with a maximum individual take-off weight not to exceed 74.3 pounds, and are limited to agricultural aircraft operations. Additionally, the HSE-UAV AG V6A+ v2 aircraft must be listed on the operator's part 137 Letter of Authorization (LOA) prior to use in any part 137 operation.

2. This exemption does not excuse the petitioner from complying with 14 CFR part 375. If operations under this exemption involve the use of foreign civil aircraft, the operator must obtain a Foreign Aircraft Permit pursuant to 14 CFR § 375.41 before conducting any operations under this exemption. Application instructions are specified in 14 CFR § 375.43.

3. The HSE-UAV AG V6A+ v2 UAS described in this exemption may not be operated at an airspeed exceeding 30 miles per hour or at an airspeed greater than the maximum operating airspeed recommended by the aircraft manufacturer, whichever is lower.

4. *Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA).* All operations must be conducted in accordance with an ATO-issued COA. The exemption holder must apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the COA. If a conflict exists between the COA and this condition, the most restrictive provision will apply. The 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 each operation. Unless the COA or other subsequently issued FAA authorization specifies an altitude restriction lower than 200 feet above

ground level (AGL), operations under this exemption may not exceed 200 feet AGL. Altitude must be reported in feet AGL.

5. The pilot in command (PIC) must be designated before the flight and cannot transfer his or her designation for the duration of the flight. In all situations, the PIC is responsible for the safety of the operation. The PIC is also responsible for meeting all applicable conditions and limitations as prescribed in this exemption and ATO-issued COA, and operating in accordance with the operating documents. The aircraft must be operated within visual line of sight (VLOS) of the PIC at all times. The PIC must 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. The PIC may manipulate flight controls in the operation of no more than one unmanned aircraft at the same time. Proposed operation of more than one unmanned aircraft at the same time (by one PIC) requires a new petition or a petition to amend this exemption.

7. All operations must utilize the services of at least one or more visual observers (VO). The VO must be trained in accordance with the petitioner's training program. For purposes of this condition, a VO is someone: (1) who maintains effective communication with the PIC at all times; (2) who the PIC ensures is able to see the unmanned aircraft with human vision as described in condition and limitation No. 5; and (3) coordinates with the PIC to scan the airspace where the UA is operating for any potential collision hazard and maintain awareness of the position of the UA through direct visual observation. The aircraft must be operated within VLOS of both the PIC and VO at all times. The operation must be conducted with a dedicated VO who has no collateral duties and is not the PIC during the flight. 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 VO must maintain visual sight of the aircraft at all times during flight operations without distraction. The PIC must ensure that the VO can perform the duties required of the VO. If either the PIC or a VO is unable to maintain VLOS with the UA during flight, the entire flight operation must be terminated as soon as practicable.

8. 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 Powers Flight Group UAS Flight Operations and Procedures Manual, Firmware Update Procedures, Emergency Procedures, Manufacturer's Manual for the HSE-UAV AG V6A+ v2, Maintenance Procedures Manual, all Preflight Checklists, and this Exemption and any ATO-issued COA that applies to operations under this exemption must be accessible during all UAS operations that occur under this exemption 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[9] to the Administrator or any law enforcement official upon request. The operator must also present the most current documents if it petitions for extension of or amendment to this grant of exemption. If the operator determines that any update or revision would affect the operator's ability to comply with any requirement of this exemption, then the operator must petition for an amendment to its grant of exemption. The FAA's General Aviation and Commercial Division may be contacted if questions arise regarding updates or revisions to the operating documents.

9. Any aircraft 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 for each aircraft 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.

10. The operator is responsible for maintaining and inspecting all aircraft to be used in the operation and ensuring that they are all in a condition for safe operation.

11. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the aircraft is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, such as 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 aircraft is found to be in a condition for safe flight.

12. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, safety bulletins, and life-limit requirements for the aircraft and aircraft components.

13. PIC certification: Under this exemption, a PIC must hold a current remote pilot certificate.

14. The PIC must also hold at least a current FAA second-class airman medical certificate. The PIC may not conduct the operation if he or she knows or has reason to know of any medical condition that would make him or her unable to meet the requirements for at least a second-class medical certificate, or is taking medicine or receiving treatment for a medical condition that results in the PIC being unable to meet the requirements for at least a second-class medical certificate. The VO or any other direct participant may not participate in the operation if he or she knows or has reason to know of any physical or mental condition that would interfere with the safe operation of the aircraft.

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[9] Updated documents should be sent to the FAA General Aviation and Commercial Division (AFS-800).

15. The remote PIC must demonstrate the ability to safely operate the UAS in a manner consistent with how it will be operated under this exemption. The PIC must demonstrate the applicable knowledge and skills requirements for agricultural aircraft operations outlined in 14 CFR part 137, evasive and emergency maneuvers, and maintaining appropriate distances from persons, vessels, vehicles and structures before operating non-training, proficiency, or experience-building flights under this exemption. Additionally, all PICs must satisfactorily complete the operator's training program requirements, the completion of which must be documented. Furthermore, the remote PIC must satisfactorily demonstrate his or her ability to respond appropriately to a lost-link occurrence as part of the knowledge and skill assessment that will occur in accordance with § 137.19(e). PIC qualification flight hours and currency may be logged in a manner consistent with 14 CFR § 61.51(b). However, time logged for UAS operations may not be recorded in the same columns or categories as time accrued during manned flight, and UAS flight time does not count toward total flight time required for any part 61 requirement.

16. All training operations must be conducted during dedicated training sessions and may not be conducted for compensation or hire. Furthermore, the PIC must operate the UA not closer than 500 feet to any nonparticipating person while conducting training operations.

17. 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). Operations may not be conducted under special visual flight rules (SVFR).

18. The aircraft 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.

19. For UAS operations where GPS signal is necessary to safely operate the aircraft, the PIC must immediately recover/land the UA upon loss of GPS signal.

20. If the PIC loses command or control link, the aircraft must follow a pre-determined route to either reestablish link or immediately recover or land.

21. The PIC must abort the flight operation if unexpected circumstances or emergencies arise that could degrade the safety of persons or property. The PIC must terminate flight operations without causing undue hazard to persons or property in the air or on the ground.

22. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for each aircraft involved in the operation to conduct the intended operation with sufficient reserve such that in the event of an emergency, the PIC can land the aircraft in a known area without posing an undue risk to aircraft or people and property on the ground. In the alternative, if the manufacturer's manual, specifications, or other documents that apply to operation of the

HSE-UAV AG V6A+ v2 recommend a specific volume of reserve power, the PIC must adhere to the manufacturer's recommendation, as long as it allows the aircraft to conduct the operation with sufficient reserve and maintain power to land the aircraft in a known area without presenting undue risks, should an emergency arise.

23. This exemption does not grant relief from the requirements concerning registration and marking of aircraft. 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.

24. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under 14 CFR §§ 91.9, 91.203, and 137.33 must be available to the PIC at the ground control station of the UAS any time any aircraft operates in accordance with this exemption. These documents must be made available to the Administrator or any law enforcement official upon request.

25. The UA must remain clear and give way to all manned aviation operations and activities at all times.

26. The UAS may not be operated by the PIC from any moving device or vehicle.

27. All flight operations must be conducted at least 500 feet from all persons who are not <u>directly</u> participating in the operation, and from vessels, vehicles, and structures, unless when operating:

    a. *Over or near people directly participating in the operation of the UAS.* No person may operate the UAS directly over a human being unless that human being is directly participating in the operation of the UAS, to include the PIC, VO, and other personnel who are directly participating in the safe operation of the UA.
    b. *Near nonparticipating persons.* Except as provided in subsection (a) of this section, a UA may only be operated closer than 500 feet to a person when barriers or structures are present that sufficiently protect that person from the UA and/or debris or hazardous materials such as fuel or chemicals in the event of an accident. Under these conditions, the operator must ensure that the person remains under such protection for the duration of the operation. If a situation arises in which the person leaves such protection and is within 500 feet of the UA, flight operations must cease immediately in a manner that does not cause undue hazard to persons.
    c. *Near vessels, vehicles and structures.* Prior to conducting operations, the operator must obtain permission from a person with the legal authority over any vessels, vehicles or structures that will be within 500 feet of the UA during

operations. The PIC must make a safety assessment of the risk of operating closer to those objects and determine that it does not present an undue hazard.

28. All operations shall be conducted from and over predetermined, uninhabited, segregated, private or controlled-access property as described in the petitioner's Flight Operations Procedures Manual. The PIC must ensure the entire operational area will be controlled[10] to reduce risk to persons and property on the ground, as well as other users of the NAS. This area of operation will include a defined lateral and vertical area where the aircraft will operate and must be geo-fenced to prevent any lateral and vertical excursions by the operating aircraft. Safety procedures must be established for persons, property and applicable airspace within the area of operation. A briefing must be conducted regarding the planned UAS operations prior to operation at each location of operation in which the operator has not previously conducted agricultural aircraft operations. All personnel who will be performing duties within the boundaries of the area of operation must be present for this briefing. Additionally, all operations conducted under this exemption may only occur in areas of operation that have been physically examined by Powers Flight Group prior to conducting agricultural aircraft operations and in accordance with the associated COA.

29. 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 within 24 hours as required by the applicable COA issued by the FAA Air Traffic Organization. Additionally, any incident or accident that occurs, or any flight operation that transgresses the lateral or vertical boundaries of the operational work area, must be reported to the FSDO that holds the operator's part 137 certificate.

Unless otherwise specified in this grant of exemption, the UAS, PIC, and operator must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 91, and 137. In addition, the petitioner must comply with all limitations and provisions of petitioner's agricultural aircraft operator certificate, which the petitioner must obtain prior to conducting agricultural operations in accordance with § 137.11.

This exemption terminates on October 31, 2020, unless sooner superseded or rescinded.

Issued in Washington, D.C., on October 11, 2018. .

/s/
Rick Domingo
Executive Director, Flight Standards Service

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[10] The operator will control access to minimize hazards to persons and property in the air and on the ground.

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

Aviation Safety

800 Independence Ave
Washington, DC 20591

In the matter of the petition of

DRONEXUM, LLC

For an exemption from §§ 61.3(a)(1)(i); 91.7(a); 91.119(c); 91.121; 91.151(b); 91.403(b); 91.405(a); 91.407(a)(1); 91.409(a)(1) and (2); 91.417(a) and (b); 137.19(c), (d), (e)(2)(ii), (e)(2)(iii) and (e)(2)(v); 137.31; 137.33; 137.41(c); and 137.42; of Title 14, Code of Federal Regulations

Exemption No 18413A
Regulatory Docket No. FAA-2019-0802

GRANT OF EXEMPTION

By letter dated February 2, 2020, and additional information posted to the docket April 30, 2020, Ms. Kelly Neubecker, Chief Executive Officer, UASolutions Group Inc., petitioned the Federal Aviation Administration (FAA) on behalf of DroneXum, LLC (DroneXum), 55 NW 9th Avenue, Homestead, FL 33030 to amend Exemption No. 18413 to provide relief from condition and limitation 27(c) of the referenced exemption. Exemption No. 18413 granted DroneXum relief from Title 14, Code of Federal Regulations (14 CFR) 61.3(a)(1)(i); 91.7(a); 91.119(c); 91.121; 91.151(b); 91.405(a); 91.407(a)(1); 91.409(a)(1) and (2); 91.417(a) and (b); 137.19(c), (d), (e)(2)(ii), (e)(2)(iii), and (e)(2)(v); 137.31; 137.33; 137.41(c); and 137.42.

The proposed amendment of Exemption No. 18413, if granted, would allow DroneXum to operate the HSE-UAV AG V8A+ v2 unmanned aircraft system (UAS), weighing 55 pounds (lbs.) or more, within the National Airspace System (NAS) for controlled, low-risk, precision commercial multi spectral crop analysis; ground moisture analysis; herbicide; and pesticide and insecticide application closer than 500 feet near vessels, vehicles, and structures.

The petitioner requests additional relief from the following regulations:

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

The petitioner supports its request with the following information:

As part of its safety risk analysis, the FAA relied on materials marked as "proprietary" by the petitioner to make determinations about the petitioner's capabilities. Accordingly, while these materials have not been released in their entirety, they have been identified in the docket for this exemption. See Attachment 1.

The petition for exemption describing the proposed operations and the regulations from which the petitioner seeks exemption is posted to the docket. To view the petition, visit http://www.regulations.gov, enter the regulatory docket number FAA-2019-0802 into the search box and click "Search," then click on the "Open Docket Folder" link next to a result associated with the docket number.

On February 2, 2020, the petitioner filed a request for amendment of Exemption No. 18413. The petitioner specifically seeks relief from condition and limitation 27(c) of Exemption No. 18413, which states:

> 27. All flight operations must be conducted at least 500 feet from all persons who are not directly participating in the operation, and from vessels, vehicles, and structures, unless when operating:
>
> ……
>
> c. *Near vessels vehicles and structures*. Prior to conducting operations, the operator must obtain permission from a person with the legal authority over any vessels, vehicles or structures that will be within 500 feet of the unmanned aircraft (UA) during operations. The pilot in command (PIC) must make a safety assessment of the risk of operating closer to those objects and determine that it does not present an undue hazard.

The FAA's analysis is as follows:

The FAA analyzed the relief granted previously to DroneXum in Exemption Number 18413 from §§ 61.3(a)(1)(i); 91.7(a); 91.121; 91.151(b); 91.405(a); 91.407(a)(1); 91.409(a)(1) and

(2); 91.417(a) and (b); 137.19(c), (d), (e)(2)(ii), (e)(2)(iii), and (e)(2)(v); 137.31; 137.33; 137.41(c); and 137.42, and determined that in consideration of the amended concept of operations, the FAA must revise the conditions and limitations of this exemption in order for those operations to be conducted without an adverse effect on safety.

As noted previously, the petitioner requested relief from condition and limitation 27(c) of Exemption No. 18413 to operate closer than 500 feet to vessels, vehicles, and structures. The additional relief would expand the relief already granted from § 91.119(c), *Minimum safe altitudes: General*. The petitioner supports its request for expanded relief by proposing to implement mitigations including altitude, speed, time restrictions, geofencing and obstacle avoidance, location, geographical alignment, and posting of signs, in addition to the use of their existing safety management system (SMS) program to identify and mitigate risks in the operations. The FAA analyzed the petitioner's proposed mitigations and determined that they are insufficient and that additional conditions and limitations would be necessary to ensure there would be no adverse effect on safety.

Based on its analysis, the FAA determined that the proposed altitude and speed restrictions, increased pilot experience, and the UAS's geofencing, combined with the petitioner's existing SMS program would have to be supplemented by all other conditions and limitations required in this exemption, to adequately mitigate the increased risk of operating closer than 500 feet, but no less than 100 feet, from vessels, vehicles or structures. Additionally, the FAA determined that operations closer than 100 feet to vessels, vehicles or structures may be conducted if the operator obtains permission from a person with the legal authority over the subject vessels, vehicles, or structures. The FAA determined the petitioner's proposed mitigations of location, time restrictions, geographical alignment, and posting of signs was not necessary to ensure safety, therefore, the FAA did not include conditions and limitations effectuating those proposed mitigations. The FAA determined the following mitigations are necessary to ensure that there amended operations do not cause an adverse effect.

The FAA's analysis of UA speed and altitude, pilot experience, and geo-fencing follows:

<u>UA speed and altitude</u>. The FAA considered the maximum distance a UA could travel in the event of a complete power loss. Based on formulas developed by FAA subject matter experts, the FAA determined that, in the event of a complete power loss, a UA flying at a ground speed of 15 mph at an altitude of 20 feet above ground level (AGL), could travel 24.6 feet before ground impact.[1] However, because the FAA cannot predict all possible failure modes, the FAA determined that adding a distance buffer is necessary to ensure safety. Accordingly, the FAA conducted further analysis and determined that by increasing the maximum distance a UA could travel in the event of a complete power loss by a factor of 4, the probability of impact with an object decreases by a factor of 16.[2] In other words, if a malfunctioning UA

[1] Distance travelled = ground speed (mph) x 1.466 x √(height/16)
[2] The inverse square formula is $1/\text{distance}^2$

continued flight, the probability of that UA hitting an object 100 feet away is 16 times less likely than the probability of the UA a hitting an object 25 feet away. Therefore, based on UA speed and altitude, the FAA determined 100 feet is a safe minimum distance.

Pilot experience. The FAA has determined increased pilot experience can reduce risk. For example, the flying hour and experience requirements for a commercial pilot are greater than those for a private pilot.[3] Likewise, the FAA has determined that an agricultural aircraft pilot operating over a congested area requires more experience than does a pilot operating over a non-congested area.[4] While manned and unmanned aircraft flight experience are not directly equivalent, the principle that risk may be mitigated through increased pilot experience is applicable to both. Moreover, just as § 137.53 requires pilots conducting operations over congested areas to have increased flight experience, this amended exemption requires pilots of UAS agricultural aircraft conducting operations closer than 500 feet to vessels, vehicles or structures to also have increased experience. However, manned and unmanned pilot flying hour experience is not the same. The FAA notes UAS aerial application flights, on average, last 9-12 minutes per flight, while manned aerial application flights last, on average, 51 minutes per flight.[5] Accordingly, for agricultural aircraft operations, one hour of UAS pilot experience can be compared to four hours of manned aircraft pilot experience. Therefore, the pilot flying hour experience conditions and limitations in this exemption are based on a per flight operations ratio of 4:1.

Geo-fencing. The HSE-UAV AG V8+v2 is equipped with redundant GPS flight control systems with geo-fencing. The geo-fence restricts UA operations to within pre-programmable flight boundaries. As a failsafe, for operations closer than 500 feet to vessels, vehicles or structures, the conditions and limitations of this exemption requires the geo-fencing feature to be active with a boundary set no closer than 100 feet from applicable waterways, roadways, or structures.

The FAA also considered § 137.49, *Operations over other than congested areas*, which permits agricultural aircraft to operate closer than 500 feet to vessels, vehicles, or structures during the actual dispensing operation. Moreover, the FAA considered § 91.119(d), which permits helicopters, powered parachutes, and weight-shift-control aircraft to operate at less than the minimums prescribed in § 91.119(c). The HSE-UAV AG V8A+ v2 is smaller, slower, carries no flammable fuel, and carries less economic poison than a manned aircraft engaged in agricultural aircraft operations, and therefore presents less hazard than larger and faster manned aircraft. Additionally, because of their size, speed, and maneuverability, UA are better suited for operations in confined areas where roadways, obstructions, or nearby structures result in increased risk. Given the above, the FAA finds relief from § 91.119(c) to

[3] 14 CFR part 61 Sections 61.109, *Aeronautical experience* and 61.129, *Aeronautical experience.*
[4] 14 CFR Section 137.53, *Operation over congested areas: Pilots and aircraft.*
[5] Report to Congress: UAS and Chemical Aerial Application, under the FAA Reauthorization Act of 2018, Public Law 115-254, Section 361, October 2019.

permit operations closer than 500 feet to vessels, vehicles, or structures in accordance with this exemption would not adversely affect safety because the petitioner will comply with the conditions and limitations in this exemption.

For the reasons stated above, Conditions and Limitations number 27 is being amended to specify conditions for operations closer than 500 feet to vessels, vehicles or structures.

Additional Amendments

Exemption No. 18413 did not address § 91.403(b) and neither the original petition nor the petition for amendment included a request for relief from said section. However, the FAA has determined that 14 CFR part 91, subpart E ("Maintenance, Preventative Maintenance, and Alterations") applies to UAS operations conducted under the general operating and flight rules of part 91. This is consistent with FAA's determination in Exemption 18596, FAA-2018-0857, issued to Overwatch Aero, LLC. Since the petitioner is unable to comply with the requirements of subpart E, including 91.403(b), the relief is necessary. The relief from § 91.403(b), addressed in the exemption, is limited only to how to perform maintenance, preventive maintenance, or alterations on an aircraft other than as prescribed in that subpart and other applicable regulations, including part 43 of Title 14. To ensure a level of safety equivalent to what would be achieved by strict compliance with those regulations, the FAA will require, as part of this exemption, that the operator follows the UAS manufacturers' operating limitations, maintenance instructions, service bulletins, overhaul, replacement, inspection, and life limit requirements for the UAS and its components. Additionally, each UAS operated under this exemption must comply with all manufacturers' safety bulletins. Furthermore, maintenance must be performed by individuals who have been trained by the operator in proper techniques and procedures for these UAS. And finally, all maintenance must be recorded in the aircraft records; including a brief description of the work performed, date of completion, and the name of the person performing the work. Based on the information provided by the petitioner and the petitioner's compliance with the conditions and limitations provided in this amendment to the petitioner's exemption, relief from the referenced portion of § 91.403(b) would not adversely affect safety.

For the reasons stated above, Conditions and Limitations number 12 is being amended to specify maintenance requirements, training, and recordkeeping; and

Additionally, the FAA is also amending Conditions and Limitations numbers 1, 2, 3, 4, 7, 8, 13, 14, 15, 17, 19, 23, 24, 28, and 29 to effect certain minor editorial changes.

Public Interest

The FAA finds that an amendment to the exemption is in the public interest. The FAA permits manned aircraft engaged in agricultural aircraft operations to operate closer than 500 feet to

vessels, vehicles, or structures during dispensing operations.[6] Manned aircraft can weigh thousands of pounds and carry hundreds of gallons of fuel and payload. Conversely, the HSE-UAV AG V8A+ v2 weighs much less than a manned aircraft, carries a much smaller payload, carries no flammable fuel, and is slower and more maneuverable. Therefore, the hazard presented by the HSE-UAV AG V8A+ v2 to a vessel, vehicle, or structure is far less than that of a manned aircraft. Additionally, because of their size, speed, and maneuverability, UA are better suited for operations in confined areas where roadways, obstructions, or nearby structures result in increased risk. For that reason, permitting UA to operate closer than 500 feet to vessels, vehicles, or structures during dispensing operations reduces the exposure of both manned aircraft and property owners to safety risk and is therefore in the public interest.

The table below summarizes the FAA's determinations regarding regulatory relief applicable to this amendment:

Relief considered (14 CFR §)	**FAA determination**
91.119(c)	Relief granted with conditions and limitations
91.403(b)	Relief granted with conditions and limitations

Additionally, as required in the conditions and limitations below, the petitioner's agricultural aircraft operator certificate indicates the HSE-UAV AG V8A+ v2 may meet the definition of a foreign civil aircraft. Before conducting operations under this exemption, the petitioner may have to obtain a Foreign Aircraft Permit pursuant to § 375.41, if part 375 applies to the operations permitted in this exemption. This exemption does not waive or exempt any requirement of part 375.

Discussion of Public Comments:

A summary of the petition was published in the Federal Register on August 4, 2020 (85 FR 47287). One comment was received from the Airline Pilots Association, International (ALPA).[7]

ALPA stated that they cannot support the petition without further understanding and assurances of mitigating measures for a UAS that weighs 100 lbs. or more. ALPA expressed concerns with the number of 14 CFR parts affected and the scope of relief requested. ALPA also expressed concerns about FAA processes for nationwide, beyond line of sight (BVLOS), commercial UAS package delivery operations. They also expressed concerns that because the petitioner's manuals are proprietary, they cannot appropriately review and comment on the petition for exemption. ALPA opposed the petitioner's request to amend condition and limitation 27(c), because, if granted, it will put the public at increased risk without mitigation. ALPA expressed concerns about reliability, safety, and operation of the UAS; pilot minimum

[6] §137.49 Operations over other than congested areas.
[7] The full text of ALPA's comment may be viewed at www.regulations.gov, Docket FAA-2019-0802-0008.

qualifications and requirements; biohazard procedures; see and avoid; pilot and observer(s) communication; flammability assessment of lithium-ion and lithium-ion polymer battery cell designed for aircraft power usage; command and control (C2) link failure modes, strategies and mitigations; and then listed their concerns by regulation. Finally, ALPA mentioned that that because the exemption is not for a single specific operation or location, the FAA's oversight task could increase and could tax FAA resources, especially in light of the COVID-19 pandemic.

The FAA has considered ALPA's concerns. Regarding the 14 CFR parts and regulations noted by ALPA, the FAA has previously provided the cited regulatory relief to the petitioner in Exemption No. 18413.

ALPA's concern about FAA processes for nationwide, BVLOS, commercial UAS package delivery operations, while noted, is beyond the scope of this exemption.

ALPA correctly cited § 11.35(b) as the rationale why proprietary information is not posted on the Docket. If received, the FAA will process a Freedom of Information Act (FOIA) request for proprietary information under the Department of Transportation (DOT) procedures found in 49 CFR part 7.

The FAA recognizes the concerns ALPA expressed regarding interference with manned aircraft operations and has incorporated associated conditions and limitations into this exemption: issuance of a Notice to Airman (NOTAM) for all operations; UAS must be equipped with an active geo-fence boundary; and the remote pilot in command and visual observer must be able to communicate verbally at all times (electronic messaging or texting are prohibited during flight operations). Additionally, the FAA already requires additional conditions and limitations designed to mitigate certain aspects of the petitioner's operation. Examples include a requirement for one or more Visual Observers (VO) during flight operations, altitude limits of 200 feet above ground level, a speed restriction of 30 miles per hour, and FAA observation of PIC knowledge and skills required by 14 CFR 137.19(e). The revised condition and limitations requiring reduced groundspeed, lower altitude, increased pilot experience, and more stringent airworthiness requirements mitigate the additional risk of operating closer than 500 feet to vessels, vehicles or structures.

Furthermore, the FAA has concluded the public interest in permitting the operations, described in this exemption and in Exemption No. 18009, on which Exemption No. 18143 is based, outweighs the concerns ALPA expressed regarding operational locations and FAA oversight. The conditions and limitations under which the petitioner will operate the UAS, combined with the design features, risk mitigation measures described in the operating documents, and the provisions of the FAA-required Certificate of Authorization (COA) address the risks the proposed operations present. As a result, the FAA concludes the operations the petitioner proposes will not adversely affect safety.

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, 44701, and 44807, delegated to me by the Administrator, DroneXum, LLC is granted an exemption from 14 CFR 61.3(a)(1)(i); 91.7(a); 91.119(c); 91.121; 91.151(b); 91.403(b); 91.405(a); 91.407(a)(1); 91.409(a)(1) and (2); 91.417(a) and (b); 137.19(c), (d), (e)(2)(ii), (e)(2)(iii), and (e)(2)(v); 137.31; 137.33; 137.41(c); and 137.42 to the extent necessary to allow DroneXum to operate the HSE-UAV AG V8A+ v2 UAS weighing more than 55 pounds (lbs.) but no more than 98.8 lbs. to provide commercial agricultural-related services, subject to the conditions and limitations described below.

Conditions and Limitations

In this grant of exemption, DroneXum, LLC is hereinafter referred to as the operator or exemption holder.

A copy of the 49 USC 44807 Blanket COA has been enclosed in this exemption.

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 include the HSE-UAV AG V8A+ v2 as described in the operating documents with a maximum take-off weight not to exceed 98.8 pounds, and are limited to agricultural aircraft operations. Additionally, the HSE-UAV AG V8A+ v2 aircraft must be listed on the operator's Title 14, Code of Federal Regulations (14 CFR) part 137 Letter of Authorization (LOA) prior to use in any part 137 operation.

2. This exemption does not excuse the operator from complying with part 375. If operations under this exemption involve the use of foreign civil aircraft, the operator must obtain a Foreign Aircraft Permit pursuant to § 375.41 before conducting any operations under this exemption. Application instructions are specified in §375.43.

3. The HSE-UAV AG V8A+ v2 described in this exemption may not be operated at a groundspeed exceeding 30 miles per hour or at any speed greater than the maximum operating speed recommended by the aircraft manufacturer, whichever is lower.

4. All operations must be conducted in accordance with an Air Traffic Organization (ATO) issued Certificate of Authorization (COA). The exemption holder must apply for a new or amended COA if it intends to conduct operations that cannot be conducted

under the terms of the COA. If a conflict exists between the COA and this condition, the more restrictive provision will apply. The COA will also require the operator to request a Notice to Airmen (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to each operation. Unless the COA or other subsequently issued FAA authorization specifies an altitude restriction lower than 200 feet above ground level (AGL), operations under this exemption may not exceed 200 feet AGL. Altitude must be reported in feet AGL.

5. The pilot in command (PIC) must be designated before the flight and cannot transfer his or her designation for the duration of the flight. In all situations, the PIC is responsible for the safety of the operation. The PIC is also responsible for meeting all applicable conditions and limitations as prescribed in this exemption and ATO-issued COA, and operating in accordance with the operating documents. The aircraft must be operated within visual line of sight (VLOS) of the PIC at all times. The PIC must 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. The PIC may manipulate flight controls in the operation of no more than one unmanned aircraft at the same time. Proposed operation of more than one unmanned aircraft at the same time (by one PIC) requires a new petition or a petition to amend this exemption.

7. All operations must utilize the services of at least one or more visual observers (VO). The VO must be trained in accordance with the operator's training program. For purposes of this condition, a VO is someone: (1) who maintains effective communication with the PIC at all times; (2) who the PIC ensures is able to see the unmanned aircraft with human vision as described in Condition and Limitation No. 5; and (3) coordinates with the PIC to scan the airspace where the unmanned aircraft (UA) is operating for any potential collision hazard and maintain awareness of the position of the UA through direct visual observation. The aircraft must be operated within VLOS of both the PIC and VO at all times. The operation must be conducted with a dedicated VO who has no collateral duties and is not the PIC during the flight. 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 VO must maintain visual sight of the aircraft at all times during flight operations without distraction. The PIC must ensure that the VO can perform the duties required of the VO. If either the PIC or a VO is unable to maintain VLOS with the UA during flight, the entire flight operation must be terminated as soon as practicable.

8. This exemption and all documents needed to operate the unmanned aircraft system (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.

DroneXum, LLC Flight Operations and Procedures Manual, Firmware Update Procedures, Emergency Procedures, Manufacturer's Manual for the HSE-UAV AG V8A+ v2, Maintenance Procedures Manual, all Preflight Checklists, and this Exemption and any ATO-issued COA that applies to operations under this exemption must be accessible during all UAS operations that occur under this exemption 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[8] to the Administrator or any law enforcement official upon request. The operator must also present the most current documents if it petitions for extension of or amendment to this grant of exemption. If the operator determines that any update or revision would affect the operator's ability to comply with any requirement of this exemption, then the operator must petition for an amendment to its grant of exemption. If questions arise regarding updates or revisions to the operating documents, the operator may contact the Flight Standards Service General Aviation and Commercial Division (AFS-800), 55 M Street, SE, 8th Floor, Zone 1, Washington, DC 20003. Telephone: 202-267-1100, Email: 9-AFS-800- Correspondence@faa.gov.

9. Any aircraft 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 other personnel required to conduct the functional flight test (such as a mechanic or technician) 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.

10. The operator is responsible for maintaining and inspecting all aircraft to be used in the operation and ensuring that they are all in a condition for safe operation.

11. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the aircraft is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, such as 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 aircraft is found to be in a condition for safe flight.

[8] Updated documents should be sent to the FAA General Aviation and Commercial Division (AFS-800).

12. The operator must follow the UAS manufacturers' operating limitations, maintenance instructions, service bulletins, overhaul, replacement, inspection, and life limit requirements for the HSE-UAV AG V8A+ v2 and its components. Each UAS operated under this exemption must comply with all manufacturers' safety bulletins. Maintenance must be performed by individuals who have been trained by the operator in proper techniques and procedures for these UAS. All maintenance must be recorded in the aircraft records including a brief description of the work performed, date of completion and the name of the person performing the work.

13. PIC certification: Under this exemption, a PIC must hold a current remote pilot certificate.

14. The PIC must also hold at least a current FAA second-class airman medical certificate. The PIC may not conduct the operation if he or she knows or has reason to know of any medical condition that would make him or her unable to meet the requirements for at least a second-class medical certificate, or is taking medication or receiving treatment for a medical condition that results in the PIC being unable to meet the requirements for at least a second-class medical certificate. The VO or any other direct participant may not participate in the operation if he or she knows or has reason to know of any physical or mental condition that would interfere with the safe operation of the aircraft.

15. The PIC must demonstrate the ability to safely operate the UAS in a manner consistent with how it will be operated under this exemption. The PIC must demonstrate the applicable knowledge and skills requirements for agricultural aircraft operations outlined in part 137, evasive and emergency maneuvers, and maintaining appropriate distances from persons, vessels, vehicles and structures before operating non-training, proficiency, or experience-building flights under this exemption. Additionally, all PICs must satisfactorily complete the operator's training program requirements, the completion of which must be documented. Furthermore, the PIC must satisfactorily demonstrate his or her ability to respond appropriately to a lost-link occurrence as part of the knowledge and skill assessment that will occur in accordance with § 137.19(e). PIC qualification flight hours and currency may be logged in a manner consistent with § 61.51(b). However, time logged for UAS operations may not be recorded in the same columns or categories as time accrued during manned flight, and UAS flight time does not count toward total flight time required for any part 61 requirement.

16. All training operations must be conducted during dedicated training sessions and may not be conducted for compensation or hire. Furthermore, the PIC must operate the UA not closer than 500 feet to any nonparticipating person while conducting training operations.

17. UAS operations may not be conducted during night, as defined in § 1.1. All

operations must be conducted under visual meteorological conditions (VMC). Operations may not be conducted under special visual flight rules (SVFR).

18. The aircraft 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.

19. For UAS operations where global positioning system (GPS) signal is necessary to safely operate the aircraft, the PIC must immediately recover/land the UA upon loss of GPS signal.

20. If the PIC loses command or control link, the aircraft must follow a pre-determined route to either reestablish link or immediately recover or land.

21. The PIC must abort the flight operation if unexpected circumstances or emergencies arise that could degrade the safety of persons or property. The PIC must terminate flight operations without causing undue hazard to persons or property in the air or on the ground.

22. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for each aircraft involved in the operation to conduct the intended operation with sufficient reserve such that in the event of an emergency, the PIC can land the aircraft in a known area without posing an undue risk to aircraft or people and property on the ground. In the alternative, if the manufacturer's manual, specifications, or other documents that apply to operation of the HSE-UAV AG V8A+ v2 recommend a specific volume of reserve power, the PIC must adhere to the manufacturer's recommendation, as long as it allows the aircraft to conduct the operation with sufficient reserve and maintain power to land the aircraft in a known area without presenting undue risks, should an emergency arise.

23. This exemption does not grant relief from the requirements concerning registration and marking of aircraft. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with part 47, and have identification (N-Number) markings in accordance with part 45, Subpart C. Markings must be as large as practicable.

24. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under §§ 91.9, 91.203, and 137.33 must be available to the PIC at the ground control station of the UAS any time any aircraft operates in accordance with this exemption. These documents must be made available to the Administrator or any law enforcement official upon request.

25. The UA must remain clear and give way to all manned aviation operations and

activities at all times.

26. The UAS may not be operated by the PIC from any moving device or vehicle.

27. All flight operations must be conducted at least 500 feet from all persons who are not directly participating in the operation, and from vessels, vehicles, and structures, unless when operating:

    a. *Over or near people directly participating in the operation of the UAS.* No person may operate the UAS directly over a human being unless that human being is directly participating in the operation of the UAS, to include the PIC, VO, and other personnel who are directly participating in the safe operation of the UA.

    b. *Near nonparticipating persons.* Except as provided in subsection (a) of this section, a UA may only be operated closer than 500 feet to a person when barriers or structures are present that sufficiently protect that person from the UA and/or debris or hazardous materials such as fuel or chemicals in the event of an accident. Under these conditions, the operator must ensure that the person remains under such protection for the duration of the operation. If a situation arises, in which the person leaves such protection and is within 500 feet of the UA, flight operations must cease immediately in a manner that does not cause undue hazard to persons.

    c. *Closer than 500 feet from vessels, vehicles and structures.* The UA may be operated closer than 500 feet, but not less than 100 feet, from vessels, vehicles, and structures under the following conditions:
        (1) The UAS is equipped with an active geo-fence boundary, set no closer than 100 feet from applicable waterways, roadways, or structures;
        (2) The PIC must have a minimum of 7 hours experience operating the specific make and model UAS authorized under this exemption, at least 3 hours of which must be acquired within the preceding 12 calendar months;
        (3) The PIC must have a minimum of 25 hours experience as a PIC in dispensing agricultural materials or chemicals from a UA;
        (4) The UA may not be operated at a groundspeed exceeding 15 miles per hour;
        (5) The UA altitude may not exceed 20 feet AGL; and
        (6) The PIC must make a safety assessment of the risk of operating closer than 500 feet from those objects and determine that it does not present an undue hazard.

    d. *Closer than 100 feet from vessels, vehicles and structures.* The UA may operate closer than 100 feet from vessels, vehicles, and structures in accordance with the conditions listed in 27.c. (2) through (6) and the following additional conditions:

(1) The UAS is equipped with an active geo-fence boundary, set to avoid the applicable waterways, roadways, or structures; and
(2) The operator must obtain permission from a person with the legal authority over any vessels, vehicles or structures prior to conducting operations closer than 100 feet from those objects.

28. All operations shall be conducted from and over predetermined, uninhabited, segregated, private or controlled-access property as described in the operator's Flight Operations Procedures Manual. The PIC must ensure the entire operational area will be controlled[9] to reduce risk to persons and property on the ground, as well as other users of the National Airspace System (NAS). This area of operation will include a defined lateral and vertical area where the aircraft will operate and must be geo-fenced to prevent any lateral and vertical excursions by the operating aircraft. Safety procedures must be established for persons, property and applicable airspace within the area of operation. A briefing must be conducted regarding the planned UAS operations prior to operation at each location of operation in which the operator has not previously conducted agricultural aircraft operations. All personnel who will be performing duties within the boundaries of the area of operation must be present for this briefing. Additionally, all operations conducted under this exemption may only occur in areas of operation that have been physically examined by the operator prior to conducting agricultural aircraft operations and in accordance with the associated COA.

29. 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 within 24 hours as required by the applicable COA issued by the FAA ATO. Additionally, any incident or accident that occurs, or any flight operation that transgresses the lateral or vertical boundaries of the operational work area, must be reported to the Flight Standards District Office (FSDO) that holds the operator's part 137 certificate.

Unless otherwise specified in this grant of exemption, the UAS, PIC, and operator must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 91, and 137. In addition, the operator must comply with all limitations and provisions of the operator's agricultural aircraft operator certificate, which the operator must obtain prior to conducting agricultural operations in accordance with § 137.11.

[9] The operator will control access to minimize hazards to persons and property in the air and on the ground.

If you request an extension or amendment to this exemption, please submit your request by using the Regulatory Docket No. FAA-FAA-2019-0802 (http://www.regulations.gov). In addition, you should submit your request no later than 120 days prior to the exemption's expiration date listed below, or 120 days before you need the amendment.

Any extension or amendment request must meet the requirements of § 11.81.

This exemption terminates on June 30, 2023, unless sooner superseded or rescinded.

Issued in Washington, D.C., on May 21, 2021. .

Sincerely,

/s/

Robert C. Carty
Deputy Executive Director, Flight Standards Service

Enclosure Exemption No. 18009 and 49 USC 44807 Blanket COA

Attachment 1

Supplemental Document(s)	Information Received
DroneXum, LLC Petition for Amendment (February 2, 2020)	The petition seeks to amend exemption 18413 to permit operations closer than 500 feet to vessels, vehicles, and structures.
DroneXum Safety Case	This safety case proposes mitigations to safely operate a UAS closer than 500 feet to vessels, vehicles, and structures.
Oak Harbor Aerial View	This is imagery of proposed operating locations.
DroneXum, LLC Petition for Exemption (October 1, 2019)	This is the original petition for exemption, Docket FAA-2019-0802.
DroneXum UAS Flight Operations and Procedures Manual	This manual contains detailed information describing DroneXum's procedures for UAS operations.
HSE AG-VA Flight Operations Checklists	These documents are DroneXum's UAS operational checklists.
DroneXum UAS Safety Management Systems (SMS)	This document contains safety policies and procedures. All DroneXum UAS activities will be conducted in accordance with safety policy and criteria established within this manual.
DroneXum UAS Aircrew Training and Procedures Program	This manual describes training for DroneXum UAS flight and ground crewmembers.
HSE AG-VA Operating Manual	This is the manufacturer's UAS operating manual.
Beihang University Inspection Report	This is an inspection report of the UAS test conducted by Beihang University's Advanced Flight Control Technology Lab.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

CERTIFICATE OF WAIVER OR AUTHORIZATION

ISSUED TO
Any Operator with a valid 49 USC 44807 Grant of Exemption

This certificate is issued for the operations specifically described hereinafter. No person shall conduct any operation pursuant to the authority of this certificate except in accordance with the standard and special provisions contained in this certificate and such other requirements of the Federal Aviation Regulations not specifically waived by this certificate.

OPERATIONS AUTHORIZED
Operation of Unmanned Aircraft System(s) (UAS) in accordance with the operators' 49 USC 44807 Grant of Exemption in Class G airspace at or below 400 feet Above Ground Level (AGL) in the National Airspace System (NAS).

LIST OF WAIVED REGULATIONS BY SECTION AND TITLE
N/A

STANDARD PROVISIONS

1. A copy of the application, made for this certificate shall be attached and become a part thereof.
2. This certificate shall be presented for inspection upon the request of any authorized representative of the Federal Aviation Administration, or of any State or municipal official charged with the duty of enforcing local laws or regulations.
3. The holder of this certificate shall be responsible for the strict observance of the terms and provisions contained herein.
4. This certificate is nontransferable.

Note: This certificate constitutes a waiver of those Federal rules or regulations specifically referred to above. It does not constitute a waiver of any State law or local ordinance.

SPECIAL PROVISIONS

Special Provisions Nos. A to G, inclusive, are set forth on the attached pages.

This Certificate of Waiver or Authorization (COA) is valid for two years from the issuance of a 49 USC 44807 Grant of Exemption and is subject to cancellation at any time upon notice by the Administrator or his/her authorized representative.

BY DIRECTION OF THE ADMINISTRATOR

/S/

FAA Headquarters
(Region)

Joseph Maibach
(Signature)

Acting Manager, UAS Policy Team, AJV-P22
(Title)

FAA Form 7711-1 (7-74)

SPECIAL PROVISIONS

A. General.

1. Unmanned aircraft have no on-board pilot to perform see-and-avoid responsibilities; therefore, when operating outside of active restricted and warning areas approved for aviation activities, provisions must be made to ensure an equivalent level of safety exists for unmanned operations consistent with 14 CFR Part 91 §91.111, §91.113 and §91.115.
2. The approval of this COA is effective only with an approved 49 USC 44807 Grant of Exemption.
3. This authorization may be canceled at any time by the Administrator, the person authorized to grant the authorization, or the representative designated to monitor a specific operation. As a general rule, this authorization may be canceled when it is no longer required, there is an abuse of its provisions, or when unforeseen safety factors develop. Failure to comply with the authorization is cause for cancellation. The operator will receive written notice of cancellation.

B. Safety of Flight.

1. The operator or pilot in command (PIC) is responsible for halting or canceling activity in the COA area if, at any time, the safety of persons or property on the surface or in the air is in jeopardy, or if there is a failure to comply with the terms or conditions of this authorization.

2. The PIC is responsible:

   a. To remain clear and give way to all manned aviation operations and activities at all times,

   b. For the safety of persons or property on the surface with respect to the UAS, and

   c. For compliance with CFR Parts 91.111, 91.113 and 91.115.

3. UAS pilots must ensure there is a safe operating distance between aviation activities and Unmanned Aircraft (UA) at all times.

4. Visual observer (s) must be used at all times and maintain instantaneous communication with the PIC.

5. The PIC is responsible to ensure visual observer(s) are:

   a. Able to see the UA and the surrounding airspace throughout the entire flight, and

   b. Able to sufficiently provide the PIC with the UA's flight path, and proximity to all aviation activities and other hazards (e.g., terrain, weather, structures) to enable the PIC to exercise effective control of the UA to prevent the UA from creating a collision hazard.

6. Visual observer(s) must be able to communicate clearly to the PIC any instructions required to remain clear of conflicting traffic.

7. The operator or delegated representative must not operate in Prohibited Areas, Special Flight Rule Areas or, the Washington National Capital Region Flight Restricted Zone. Operations in the Washington DC Special Flight Rule Area may be conducted in accordance with FDC NOTAM 6/1117. Such areas are depicted on charts available at http://www.faa.gov/air_traffic/flight_info/aeronav/. Additionally, aircraft operators should abide by Notices to Airmen (NOTAMS) that restrict operations in proximity to power plants, electric substations, dams, wind farms, oil refineries, industrial complexes, national parks, the Disney resorts, stadiums, emergency services, the Washington DC Metro Flight Restricted Zone (FRZ), military or other federal facilities.

C. Reporting Requirements.

1. Documentation of all operations associated with UAS activities is required, regardless of the airspace within which the UAS operates. **NOTE:** Negative (zero flights) reports are required.

2. The proponent must submit the following information to 9-AJV-115-UASOrganization@faa.gov on a monthly basis:

   a. Name of operator, Exemption number, and aircraft registration number

   b. UAS type and model

   c. All operating locations to include location city/name and latitude/longitude

   d. Number of flights (per location, per aircraft)

   e. Total aircraft operational hours

   f. Takeoff or Landing damage

   g. Equipment malfunctions. Reportable malfunctions include, but are not limited to the following:

      (1) On-board flight control system

      (2) Navigation system

      (3) Power plant failure in flight

      (4) Fuel system failure

      (5) Electrical system failure

      (6) Control station failure

   h. The number and duration of lost link events (control, performance and health monitoring, or communications) per aircraft per flight.

D. Notice to Airmen (NOTAM).

A distant (D) NOTAM must be issued when unmanned aircraft operations are being conducted.

This requirement may be accomplished:

1. Through the operator's local base operations or NOTAM issuing authority, or

2. By contacting the NOTAM Flight Service Station at 1-877-4-US-NTMS (1-877-487- 6867) not more than 72 hours in advance, but not less than 24 hours prior to the operation, unless otherwise authorized as a special provision. The issuing agency will require the:
   a. Name and address of the pilot filing the NOTAM request.
   b. Location, altitude, and/or operating area.
   c. Time and nature of the activity.
   d. Number of UAS flying in the operating area.

3. The area of operation defined in the NOTAM must only be for the actual area to be flown for each day and defined by a point and the minimum radius required to conduct the operation.

4. The operator must cancel applicable NOTAMs when UAS operations are complete or will not be conducted.

E. Coordination Requirements.

1. Operators and UAS equipment must meet the requirements (communication, equipment, and clearance) of the class of airspace within which the UAs will operate.

2. Operator filing and the issuance of required distance (D) NOTAM will serve as advance ATC facility notification for UAS operations in an area.

3. Coordination and de-confliction between Military Training Routes (MTRs) is the operator's responsibility. When identifying an operational area the operator must evaluate whether an MTR will be affected. In the event the UAS operational area overlaps an MTR, the operator will contact the scheduling agency 24 hours in advance to coordinate and de-conflict. If unable to determine the MTR point of contact, contact the FAA at email address mail to: 9-AJV-115-UASOrganization@faa.gov with the IR/VR routes affected and the FAA will provide the scheduling agency information. If prior coordination and de-confliction does not take place 24 hours in advance, the operator must remain clear of all MTRs. Scheduling agencies for SUAs are listed in the FAA JO 7400.8.

F. Flight Planning Requirements.

1. Operations must be under Visual Meteorological Conditions (VMC) and meet the following conditions and limitations:
   a. At or below 400 feet AGL, and
   b. Beyond the following distances from the airport reference point (ARP) of a public use airport, heliport, gliderport, or seaport listed in the Digital - Chart Supplement (d-CS), Alaska Supplement, or Pacific Chart Supplement of the U.S. Government Flight Information Publications:
      (1) 5 nautical miles (NM) from an airport having an operational control tower; or
      (2) 3 NM from an airport having a published instrument flight procedure, but not having an operational control tower; or

(3) 2 NM from an airport not having a published instrument flight procedure or an operational control tower; or

(4) 2 NM from a heliport.

2. For all UAS requests not covered by the conditions listed above, the exemption holder may apply for a new Air Traffic Organization (ATO) COA at https://caps.faa.gov/coaportal.

G. Emergency/Contingency Procedures.

1. Lost Link/Lost Communications Procedures: 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 and land.
2. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries defined in this COA must be reported to the FAA via email at: 9-AJV-115-UASOrganization@faa.gov within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

AUTHORIZATION

This COA does not, in itself, waive any Title 14 Code of Federal Regulations, nor any state law or local ordinance. Should the proposed operation conflict with any state law or local ordinance, or require permission of local authorities or property owners, it is the responsibility of the operator to resolve the matter. This COA does not authorize flight within Special Use airspace without coordinating and de-conflicting with the scheduling agency. The operator is hereby authorized to operate the Unmanned Aircraft System in the National Airspace System.