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05/23/2022

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

RE: Petition seeking relief under Section 44807 of the FAA Reauthorization Act of 2018

Dear Sir or Madam:

Davey Resource Group, Inc. (THE COMPANY) petitions for an exemption from the listed FAR's to conduct agricultural aircraft operations as per 14 C.F.R. § 137.3. The authority for the FAA to grant this petition is from 14 C.F.R. Part 11.

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I. Summary

THE COMPANY is requesting exemptions under 49 U.S.C. §44807 of the FAA Reauthorization Act of 2018 (P.L. 115-254) to Conduct Commercial Agricultural Services.

Scope of relief includes:

- Under 165lb Takeoff Weight
- Carriage and Release of Hazardous Cargo
- Inspection, Personnel, and other Aircraft Certification Requirements

The aircraft will be the Hylio AG-130. Manuals containing proprietary information for training, maintenance, and operation of both aircraft will be included in support of this petition.

II. Petitioner Information

THE COMPANY Mailing Address

1500 N Manuta St.

Kent, OH 44240

Contact Information

832 235 0839

III. Regulations Petitioner Requests Relief

14 CFR § 61.3(a)(1)(i)	Requirement for certificates, ratings, and authorizations
14 CFR § 91.119(c)	Minimum safe altitudes: General
14 CFR § 91.121	Altimeter Settings
14 CFR § 91.151(b)	Fuel Requirements for Flight in VFR Conditions
14 CFR § 91.403(b)	General
14 CFR § 91.405(a)	Maintenance Required
14 CFR § 91.407(a)(1)	Operation after maintenance, preventive maintenance, rebuilding or alteration
14 CFR § 91.409(a)(1)&(2)	Inspections
14 CFR § 91.417(a)&(b)	Maintenance Records
14 CFR § 91.7(a)	Civil Aircraft Airworthiness
14 CFR § 137.19(c)	Certification Requirements, Commercial Operator-pilots
14 CFR § 137.19(d)	Certification Requirements, Aircraft
14 CFR § 137.19(e)(2)(ii), (iii) & (v)	Certification Requirements, Knowledge and skill tests, skills, Approaches to the working area, Flare-outs, & Pullups and turnarounds
14 CFR § 137.31	Aircraft Requirements, Certification Requirements, Shoulder Harness
14 CFR § 137.33	Carrying of certificate, Certificate carried on the aircraft, Registration and airworthiness certificates available
14 CFR § 137.41(c)	Personnel, Pilot in command, demonstration of knowledge and skills
14 CFR § 137.42	Fastening of safety belts and shoulder harnesses

IV. Extent of Relief

We have written much of this request to match the waivers granted in the FAA exemption listed below.

Exemption No.	Petitioner	Docket No.
18009	Powers Flight Group	FAA-2018-0574

We analyzed the exemptions requested by these and other petitioners and noted that the FAA determined many exemptions to be “Relief not necessary” or “Relief not warranted”. We have limited our request to only exemptions where relief was granted with or without conditions or limitations. We accept the following conditions assigned to the relief granted in the waivers referenced above.

Conditions accepted:

1. The UAS must be listed on the operator’s part 137 LOA

2. This exemption and all other operating documents to include those required by parts 91.9, 91.203 and 137.33 will be accessible to the Administrator upon on-site request during UAS operations

3. The UAS will be operated below 200’ AGL and less than 30 mph (unless operating within the under-500ft exception, more restrictive limitations will be followed)

4. The operator will request and conduct operations under an ATC COA in accordance with the most restrictive conditions of either this waiver or COA including, if required notification via NOTAM between 72 and 48 hours prior to each operation

5. Prior to each mission the PIC will be designated before the flight and those responsibilities will not be transferred during the flight. The PIC will also be responsible for compliance with all conditions and limitations prescribed in this exemption and ATO-issued COA and the operating documents

6. Following any maintenance or alterations that affect the operation or flight characteristics of the UAS a functional test flight will be conducted prior to resuming operations approved under this waiver

7. THE COMPANY will follow the manufacturer’s (Hylio) maintenance manuals and any updates for upkeep and operation of the UAS

8. The remote PIC will demonstrate the applicable part 137 skills and knowledge for operating a UAS in aerial agricultural applications

9. For UAS operations requiring a GPS signal for the safe operations of the vehicle, the remote PIC will immediately recover/land the UAS upon loss of GPS signal

10. If the remote PIC loses command or control link with the UAS, the vehicle will be pre-programmed to follow a specific route to either reestablish link or immediately recover or land

11. Not valid outside the United States

12. For missions requiring one or more VOs; the PIC will ensure effective communication is maintained within the crew, the PIC will ensure that the VO(s) is/are able to see the UAS with human vision when operating under VLOS. When operating under Ag BVLOS the PIC will ensure the VO(s) is/are able to clear the entire airspace overlying the area of operation. If the PIC and VO(s) are unable to perform their duties for the entire mission, then the flight will be ended as soon as practicable

13. The operator will be responsible for, prior to each flight, conducting a thorough pre-flight inspection and determining vehicle airworthiness for a safe flight. This pre-flight inspection will be IAW with manufacturer's instructions

14. The PIC will hold both a current remote pilot certificate and at least a current second-class FAA airman medical certificate. If the PIC knows of any medical condition, is taking medicine, or is receiving treatment for a condition that would make them unable to meet the requirements for conducting the mission safely they many not act as PIC. Likewise, if the VO knows or has reason to know of any condition that would interfere with their ability to meet their crew duties then they may not serve in that capacity for the mission

15. All training operations, including operation of a single vehicle or a flight of vehicles will be conducted during a dedicated training session. Additionally, the UAS(s) will be operated no closer than 500ft from nonparticipating persons unless they are sheltered in a building or vehicle

16. All UAS operations under this waiver will be conducted under VFR cloud clearances for operations less than 10,000' MSL in class E airspace per 14 CFR § 91.155

17. The PIC will ensure prior to flight that each UAS has enough power available to conduct the intended mission segment with sufficient reserve such that in the event of an emergency it can be landed in a known area without undue hazard or risk to people or property on the ground. When determining power requirements, the PIC will adhere to the manufacturer's recommendations

18. When operating under this exemption all aircraft will be registered under part 47 of 14 CFR and marked in accordance with part 45 as large as practicable

19. The UAS will remain clear and give way to all manned aviation operations

20. Operations under this exemption will be conducted over predetermined, uninhabited, private or controlled-access property in the CONUS

21. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined in the COA will be reported within 24 hours to the ATO and to the FSDO that holds the operator's part 137 certificate

V. Condition/Limitation: Under 500ft

Additional relief is requested from a common condition/limitation. The relief requested below is intended to match relief granted to DroneXum in Grant 18413A. The condition/limitation Grant 18413A requests relief from is as follows:

"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 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."

THE COMPANY requests relief from this condition. THE COMPANY requests that all conditions and limitations in the previous section be followed, and when flying within 500ft the following additional conditions and limitations be followed. THE COMPANY Requests that the FAA not request public comment on its petition because it would not set any precedent and because the relief requested is identical to the already approved petition by DroneXum Exemption No. 18413A, granted previously by the FAA. 14 C.F.R. § 11.87. In addition, THE COMPANY will be utilizing the same proven technologies and mitigations the FAA has already accepted and approved in that exemption.

The new conditions and limitations granted to DroneXum are as follows:

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. 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.

THE COMPANY intends to follow these conditions and limitations as well as other internal protocols. The proprietary ConOps and Risk Assessment Manuals outline these protocols and should provide the support necessary to grant the waiver, and demonstrate how an equivalent level of safety is achieved. A section can be found in each of these documents with specific reference to the under 500ft limitation.
(CONOPS Manual Page 10)
(Risk Assessment & Mitigation Manual Page 12)

VI. Relief Purpose and Safety Rationale

A. 14 CFR § 61.3(a)(1)(i)

Regulation
(a) Required pilot certificate for operating a civil aircraft of the United States. No person may serve as a required pilot flight crewmember 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 and in accordance with § 61.19;
Why Petitioner is Seeking Relief
This will be very restrictive to spraying with UAS.
Equivalent Level of Safety
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 this exemption, would apply to all remote pilots who conduct operations under this exemption.

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.

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).

B. 14 CFR § 91.119(c)

Regulation
Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes: (a) Anywhere. An altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface. (b) Over congested areas. Over any congested area of a city, town, or settlement, or over any open air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft (c) Over other than congested areas. An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure. (d) Helicopters, powered parachutes, and weight-shift-control aircraft. If the operation is conducted without hazard to persons or property on the surface - (1) A helicopter may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section, provided each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA; and (2) A powered parachute or weight-shift-control aircraft may be operated at less than the minimums prescribed in paragraph (c) of this section.
Why Petitioner is Seeking Relief
This will be very restrictive to spraying with UAS.
Equivalent Level of Safety
During operations with the AG-130 the average altitude will not be more than 10 feet in order to apply the ag products effectively. Due to the configuration of some farms the crop land can be within 500 feet of buildings. An equivalent level of safety for users of the NAS can be achieved because the AG-130 will be operated at speeds below 25 mph nearly exclusively over the target treatment area. By keeping the altitude ultra-low and slow during these missions in remote rural areas with the immediate ability to land in a matter of seconds these operations will not add risks to other users of the NAS. It is plausible that on many sorties the vehicle may never need to fly above 20 feet agl in order to complete the mission. For these reasons THE COMPANY is requesting a waiver to the minimum altitude requirements of section 119 of part 91.

C. 14 CFR § 91.121

Regulation
(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.
Why Petitioner is Seeking Relief
The types of systems on a current UAS do not make sense with this rule.
Equivalent Level of Safety
The requirement to maintain cruising altitude through the use of a barometric altimeter set to the elevation of the departure field contained in §91.121 has been waived for other petitioners because the PIC has access to equivalent or more accurate altitude information from other systems. The AG-130 uses three systems to measure and report altitude to the operator. The primary method is a radar altimeter which reports altitude above ground level. This is much more germane to the low altitude missions of this UAS because maintaining a specific distance from the crop canopy ensures the desired pesticide coverage. Further UAS restrictions are measured in AGL not MSL so the most appropriate method of determining UAS altitude is a radar altimeter. In the event of a radar altimeter failure the UAS uses a barometric measurement in conjunction with the three-dimensional GPS location solution to ensure the UAS executes the preloaded flight plan. These systems are also used by the geofencing feature to ensure the UAS remains in the target treatment zone and successfully returns to the designated landing area at the appropriate time. Request relief from section 121 for the aforementioned reasons.

D. 14 CFR § 91.151(b)

Regulation
(b) 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.
Why Petitioner is Seeking Relief
The time scales in this rule do not make sense for UAS.
Equivalent Level of Safety
Due to the close proximity of the target treatment field and the launch site the ferry distances for these UAS ops are measured in seconds and feet rather than minutes and miles. Additionally, hexacopter UAS's can land in a matter of seconds especially when they are operating over cropland, the greatest risk of an unscheduled landing would be over treatment of a part of the field and potentially damage to a couple of the millions of plants in a field. Part 91 section 151 prescribes minimum fuel requirements. Most sorties flown by this UAS will be shorter than 20 minutes. For battery powered vehicles like the Hylio AG-130 the FAA has previously approved waivers to this requirement replacing it with a 5-minute reserve or the manufacturers recommendation. THE COMPANY plans to implement the safe approach if this waiver is approved to achieve an equivalent level of safety to section 151.

E. 14 CFR § 91.403(b)

Regulation
(b) No person may perform maintenance, preventive maintenance, or alterations on an aircraft other than as prescribed in this subpart and other applicable regulations, including part 43 of this chapter.
Why Petitioner is Seeking Relief
This will be very restrictive to spraying with UAS.
Equivalent Level of Safety
Section 91.403(b) says, “No person may perform maintenance, preventive maintenance, or alterations on an aircraft other than as prescribed in this subpart and other applicable regulations, 6See Leading Edge Associates, Inc. Exemption No. 17744; see also Yamaha Motor Corporation, U.S.A. Exemption No. 11448B. 7 14 C.F.R. § 91.121. Page 9 of 12 including part 43 of this chapter.” Section 91.405 paragraph (a) requires that an aircraft operator or owner “shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter”8 and maintain the aircraft in compliance with Part 43. Section 91.407 paragraph (a)(1) prohibits, in pertinent part, any person from operating an aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless it has been approved for return to service by a person authorized under § 43.7 of the same chapter. Section 91.409 paragraph (a)(1) requires that the aircraft cannot be operated unless it has had an annual inspection. Section 91.417 paragraphs (a) and (b) requires the owner/operator to keep a list of records of inspections required by the other regulations. These regulations primarily should be viewed as a whole in that they are requiring the owner/operator to maintain/repair the “Aircraft having a U.S. airworthiness certificate[,]”9 while maintaining records of this, using Part 43 and certified individuals. While this makes sense for manned aircraft that are certified, it does not always make sense for unmanned aircraft which do not have airworthiness certificates. The aircraft manufacturer and operators are best positioned for determining the airworthiness of the aircraft. Florida Power & Light Company proposes that the supporting operating documents confidentially submitted and proposed restrictions 10-14 will provide an equivalent level of safety as the regulations listed. It must be noted here that the FAA appears to have never granted an exemption for 91.403(b) for unmanned aircraft. Section 91.403 paragraph (b) says, “No person may perform maintenance, preventive maintenance, or alterations on an aircraft other than as prescribed in this subpart and other applicable regulations, including part 43 of this chapter.” It logically follows that if an exemption from 91.405 (a); 91.407 (a) (1); 91.409 (a)(1); 91.417(a) & (b) is granted, 91.403(b) which references all of these regulations, because they are in Subpart E of Part 91, must be exempted also; otherwise, 91.403(b) works against the exemption.

F. 14 CFR § 91.405(a)

This section is used to describe relief from the regulations pertaining to aircraft maintenance in section E, F, G, and H.

Regulation
Each owner or operator of an aircraft - (a) Shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter;
Why Petitioner is Seeking Relief
The regulations pertaining to maintenance on manned aircraft are extremely burdensome and unnecessary when applied to small UAS.
Equivalent Level of Safety
In exemption number 11448 and subsequent amendments the FAA granted relief from these regulations for the Yamaha RMAX helicopter UAS. During that waiver process the FAA articulated that UAS operators need to request relief from the aforementioned sections of part 91 because they apply to aerospace vehicles that are certificated. Since UASs are not certificated but their airworthiness is determined in a different fashion, THE COMPANY is requesting the same relief granted other UAS operators namely from the §91.7(a) requirement for an airworthiness certificate. Hylio has developed the AG-130 over several years operating permissively to support farmers in Central America. During this time, it has demonstrated 1000 hours of mishap free operation while treating 15000 acres of crop land. These experiences have enabled Hylio to develop detailed operations and maintenance instructions and procedures. THE COMPANY will conduct their operations in accordance with the Hylio guidance and applicable conditions of this waiver to include pilot verification prior to each sortie that the vehicle is safe to operate in the NAS. As with the conditions of other grants of waiver to these regulations THE COMPANY will conduct functional test flights under part 107 basic rules at least 500 feet from any non-participating people following replacement or maintenance to any flight critical components. All sorties will only be conducted after ensuring that any conditions affecting the safety of flight of the vehicle have been properly addressed in accordance with maintenance guidance. We will follow the Hylio guidance for recurring inspection and time change items on the vehicle. Other attributes of the THE COMPANY operation will serve to mitigate risks to the NAS by flying sorties that are short in duration, using only the minimum altitude required mission accomplishment and always in a position to land in a matter of seconds should the need arise. For these reasons THE COMPANY believes it can achieve an equivalent level of safety to other vehicles and conduct operations without adding risks to users of the NAS.

G. 14 CFR § 91.407(a)(1)

Regulation
(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;
Why Petitioner is Seeking Relief
Refer to justification in section E.
Equivalent Level of Safety
Refer to justification in section E.

H. 14 CFR § 91.409(a)(1)&(2)

Regulation
(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.
Why Petitioner is Seeking Relief
Refer to justification in section E.
Equivalent Level of Safety
Refer to justification in section E.

I. 14 CFR § 91.417(a)&(b)

Regulation
(a) Except for work performed in accordance with §§ 91.411 and 91.413, each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section: (1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include - (i) A description (or reference to data acceptable to the Administrator) of the work performed; and (ii) The date of completion of the work performed; and (iii) The signature, and certificate number of the person approving the aircraft for return to service. (2) Records containing the following information: (i) The total time in service of the airframe, each engine, each propeller, and each rotor. (ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance. (iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis. (iv) The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained. (v) The current status of applicable airworthiness directives (AD) and safety directives including, for each, the method of compliance, the AD or safety directive number and revision date. If the AD or safety directive involves recurring action, the time and date when the next action is required. (vi) Copies of the forms prescribed by § 43.9(d) of this chapter for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances. (b) The owner or operator shall retain the following records for the periods prescribed: (1) The records specified in paragraph (a)(1) of this section shall be retained until the work is repeated or superseded by other work or for 1 year after the work is performed. (2) The records specified in paragraph (a)(2) of this section shall be retained and transferred with the aircraft at the time the aircraft is sold. (3) A list of defects furnished to a registered owner or operator under § 43.11 of this chapter shall be retained until the defects are repaired and the aircraft is approved for return to service. (c) The owner or operator shall make all maintenance records required to be kept by this section available for inspection by the Administrator or any authorized representative of the National Transportation Safety Board (NTSB). In addition, the owner or operator shall present Form 337 described in paragraph (d) of this section for inspection upon request of any law enforcement officer. (d) When a fuel tank is installed within the passenger compartment or a baggage compartment pursuant to part 43 of this chapter, a copy of FAA Form 337 shall be kept on board the modified aircraft by the owner or operator.
Why Petitioner is Seeking Relief
Refer to justification in section E.
Equivalent Level of Safety
Refer to justification in section E.

J. 14 CFR § 91.7(a)

Regulation
(a) No person may operate a civil aircraft unless it is in an airworthy condition.
Why Petitioner is Seeking Relief
No airworthiness certificate is issued for this UAS. This regulation is extremely burdensome and unnecessary to fulfill for a UAS.
Equivalent Level of Safety
While the UAS operated by THE COMPANY will not have an airworthiness certificate, consistent with the FAA's determination in the Yamaha Exemption, the pilot may determine the UAS is in an airworthy condition prior to flight. As described more fully in the operating documents, this is achieved through adherence to Hylio's routine pre-flight checklist.

K. 14 CFR 137.19(c)

Regulation
(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.
Why Petitioner is Seeking Relief
In a previous exemption granted to DroneSeed, Exemption No. 17261, the FAA determined that relief from § 137.19(c) was necessary to permit persons holding a remote PIC certificate with small UAS rating to act as PIC for commercial agricultural aircraft operations when utilizing a small UAS to conduct the operations. The FAA found that a commercial or airline transport certificate that § 137.19(c) requires was not a reasonable requirement for the small UAS agricultural operations proposed by DroneSeed.
Equivalent Level of Safety
The basis for the relief was that DroneSeed's remote PICs would comply not only with the requirements of Part 107, subPart C, but also with the additional knowledge and applicable skill requirements in FAR § 137.19(e)(1) and (2)(i), (iv) and (vi). The relief was also based, in Part, on DroneSeed's compliance with the training requirements in its operating documents. While the proposed operations in this petition for exemption for THE COMPANY involve the operation of UAS weighing 55 pounds or more, the proposed operations are otherwise identical to that previously approved by the FAA in Exemption No. 17261. Consistent with the FAA's prior analysis, compliance with the requirements of Part 107, subpart C, the additional knowledge and applicable skill requirements in FAR § 137.19(e)(1) and (2)(i), (iv) and (vi), and compliance with the training requirements in Hylio operating documents, will ensure that an equivalent level of safety will be achieved.

L. 14 CFR 137.19(d)

Regulation
(d) Aircraft. The applicant must have at least one certificated and airworthy aircraft, equipped for agricultural operation.
Why Petitioner is Seeking Relief
This regulation is extremely burdensome and unnecessary.
Equivalent Level of Safety
Small unmanned aircraft operated under Part 107 do not have any aircraft certification requirements. Under Part 107, the remote pilot in command is responsible for determining if the aircraft is airworthy. The requirements contained in the manufacturer's manuals, the requirement in Part 107 for the remote pilot to conduct pre-flight inspections of the aircraft, and the requirement of the agricultural aircraft operator certificate be obtained prior to flight will be in total sufficient for determining the airworthiness of the aircraft which provides an equivalent level of safety as the regulations for agricultural aircraft operations. Furthermore, because these small UA are very limited in size and will carry a small chemical payload and operate only in restricted areas for limited periods of time, the risk to the public is lower. Moreover, the Petitioner is the one best suited to maintain the aircraft in an airworthy condition to provide the equivalent level of safety as the regulations. Although this aircraft is not within the guidelines of 107, it is very similar and will also have no issued certificate of airworthiness as described in section "J. 14 CFR § 91.7(a)". Without a certificate of airworthiness, the above argument for UAS under part 107 should stand just the same for Hylio UAS under 140lbs.

M. 14 CFR 137.19(e)(2)(ii), (iii) & (v)

Regulation
(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: (ii) Approaches to the working area. (iii) Flare-outs. (iv) Swath runs. (v) Pullups and turnarounds.
Why Petitioner is Seeking Relief
Section 137.19 paragraphs (e)(2)(ii)-(v) are unnecessary and not applicable for unmanned aircraft. As the FAA stated in Exemption 17261, “the FAA has determined that demonstration of the skills described in these paragraphs is not necessary because they are not compatible or applicable to” agricultural aircraft operations with multi-rotor unmanned aircraft. Therefore, relief should be granted to agricultural aircraft operations which utilize only small UAS.
Equivalent Level of Safety
An equivalent level of safety can be obtained by requiring the remote pilot to have a valid remote pilot certificate, requiring the Petitioner to obtain prior to operations an agricultural aircraft operations certificate, and requiring that operations must be done under the proposed restrictions of this petition.

N. 14 CFR 137.31

Regulation
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.
Why Petitioner is Seeking Relief
This regulation is designed to protect people on board the aircraft.
Equivalent Level of Safety
Since there are no people on board, whether we follow it or not, the impact on safety is the same. However, because the law requires it, we require an exemption from this regulation. Therefore, an equivalent level of safety can be achieved by flying under the proposed restrictions herein.

O. 14 CFR 137.33

Regulation
(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.
Why Petitioner is Seeking Relief
There is no benefit to keep certificates on the aircraft, when they will be much more available to any inspector if located at the ground station. Further, the UAS being used will not be issued an airworthiness certificate.
Equivalent Level of Safety
A similar situation was addressed in the FAA legal opinion letter of Mark Bury to John Duncan on August 8, 2014 where the FAA general counsel's office answered whether registration and airworthiness documents must be carried aboard an unmanned aircraft. Mr. Bury said, "we find that the intent of these regulations is met if the pilot of the unmanned aircraft has access to these documents at the control station from which he or she is operating the aircraft." Likewise, the Petitioner here proposes to keep the agricultural aircraft operator certificate and registration all at the ground station. These documents can be available for inspection by the FAA or law enforcement. This all provides an equivalent level of safety as the regulations. Additionally, the Petitioner needs relief from paragraph (b) because the UAS will not be issued an airworthiness certificate as detailed in section "J. 14 CFR § 91.7(a)" and it would be extremely burdensome to acquire an airworthiness certificate in order to comply with this paragraph of the regulation. An equivalent level of safety can be reached by requiring the remote pilot to obtain an agricultural aircraft operators' certificate prior to operations and conducting pre-flight inspections.

P. 14 CFR 137.41(c)

Regulation
(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.
Why Petitioner is Seeking Relief
This regulation is extremely burdensome and unnecessary.
Equivalent Level of Safety
As found in the previously granted exemption 17261, an equivalent level of safety of the regulations can be achieved by requiring a remote pilot certificate, operations to be done in accord with Parts 107 & 137, an agricultural aircraft operations certification be obtained prior to operations, and the proposed restrictions in this exemption.

Q. 14 CFR 137.42

Regulation
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.
Why Petitioner is Seeking Relief
This regulation is designed to protect people on board the aircraft.
Equivalent Level of Safety
Since there are no people on board, whether we follow it or not, the impact on safety is the same. However, because the law requires it, we require an exemption from this regulation. Therefore, an equivalent level of safety can be achieved by flying under the proposed restrictions herein.

VII. Benefit to Public Interest

THE COMPANY will be utilizing technology developed and manufactured in the USA, helping to advance the local UAS industry.

UAS may be used in the event that there is no other way to safely spray a certain land area. This will reduce the chance of manned aircraft attempting to spray certain dangerous areas. The result will be reduced risk for pilots and the public.

UAS are significantly smaller and lighter than manned aircraft. In the event of a crash, the UAS poses a greatly reduced threat to the public. UAS also have much smaller propellers, reducing the risk of injury to the public in the event of a crash.

UAS are much quieter than manned airplanes. UAS will create much less noise pollution than manned aircraft. This is especially important for near-urban aerial applications.

UAS use batteries for power, which is not as flammable and explosive as the fuel used for the majority of manned aircraft. In the event of a crash, there is a significant risk of explosion. There will also be a reduction in air pollution.

UAS operate at much lower altitude than manned aircraft. This vertical separation greatly reduces the chance of a mid-air collision and the following catastrophic damage to the aircraft involved, and the public.

UAS allow for methods of precision spraying that are not possible with manned aircraft. Precision spraying has the potential to increase the efficiency of US agriculture as a whole. These precision applications will greatly benefit the US farmer while operating with equivalent or greater levels of safety compared to manned aircraft.

VIII. Aircraft Information

AG-130 Spec Sheet

Flight Parameters	
Total Weight (without batteries)	61.3 lb
Max Recommended Takeoff Weight	165 lb
Max Thrust	269.6 lb
Max Operating Speed	22 mph
Max Flight Speed	40 mph
Propulsion System	
Motor KV	100 rpm/V
Foldable Propeller	30x9.0 in
Configuration	Octocopter
Operating Voltage	12s
Battery	2 x 12S (44.4V) LiPo Batteries
	11.3 lb/battery
Aircraft Frame	
Wheelbase	83.5 in
Material	Carbon Fiber, Aluminum, Plastic
Dimensions	81x81x25 in (arms unfolded, no propellers)
	44x44x25 in (arms folded, no propellers)
Spray System	
Standard Payload	67 lbs, 8 gallon
Configuration	2 Pumps, 2 Tanks, 2 Flowmeters, 8 nozzles underneath rotors
Nozzle	Nozzle body compatible with any Teejet spray tip
Pump	Diaphragm Pump, 65 PSI
Flow Rate (no nozzle max)	0.1 – 2.0 Gal/min
Flow Rate (with recommended nozzle TT11001)	1.3 Gal/min
Spray Width	20-30 feet
Flight Control	
Flight Modes	Fully autonomous (no RC), position hold manual (with RC), Fully manual GPS denied (with RC)
Operating Frequencies	902 – 928 MHz, 2.4 GHz
Ground Station Control Software	Hylio Agrosol
Max Transmission Range	~1 mile (5+ unobstructed)

AG-130 Systems Information

The AG-130 contains an array of features to both enhance safety and assure its ability to effectively conduct the mission. All of the listed features are held by the AG-130 aircraft. Among these features are:

Rotor Fail Protection - If one rotor fails, the flight controller will compensate for the lost rotor and immediately travel to a safe land point. The flight controller will notify the operator via on-screen warnings as it returns to land. The aircraft will maintain stability, allowing the flight controller to safely land, or the operator to take control and manually land.

Ground Software System – THE COMPANY and all AG-130 owners use a UAS control software known as Hylio AgroSol. Hylio Inc. developed AgroSol for the express purpose of controlling Hylio Inc. agricultural drones. AgroSol has been used for ground station control of all recorded flight hours on the AG-130.

Return-To-Launch (RTL) - The operator has access to an RTL command which they can use to instantly stop the UAS and return it to the set landing point at a predetermined, safe altitude.

Land - In the event that the primary and all backup land points have been compromised, the UAS can be autonomously landed in any other safe location. This can be completed using the ground control software without requiring manual RC control.

Emergency Pause - The operator has systems that can be used to instantly stop the UA during the mission, where the drone will pause and hover in place, awaiting further commands. It can then be manually moved to a new location, and forced to land at the alternate safe landing location, or return to launch for landing.

Geofencing - The UAS's flight controller is given GPS coordinates of a boundary that it cannot leave, keeping the UAS from leaving the pre-determined and defined operations area. When enabled, the UAS can "hit" the perimeter, but not fly past or through it. Manual or automatic inputs commanding the UAS to break the geofence are ignored. In the event the geofence is broken, the UAS will automatically enter RTL mode and return home to land.

Beacon - In the extremely unlikely event of a system malfunction that causes a crash, a beacon attached to the UAS will help the PIC and ground crew quickly locate it, ensuring a quick response to secure the equipment and surrounding area.

Redundant GPS - All UAS are equipped with redundant GPS units. Should the primary GPS unit experience a failure, a second GPS unit will automatically takeover as a failsafe to ensure accurate positioning and navigation is maintained. During regular operation, the GPS signals are blended to improve position accuracy. The system offers full redundancy of GPS (2), IMU (3), and Compass (3). If one or multiple units fail, the controller will switch in real-time between the redundant compass, IMU, and GPS.

Telemetry - Should a telemetry link to the base station be lost, the UAS has all mission parameters stored onboard, and can safely continue to execute a mission. The UAS will automatically return to land with or without telemetry link when the tank or batteries are low. The base station computer will alert the PIC when telemetry communication is lost, who may opt to allow the UAS to continue its mission if it is safe to do so, or interrupt the mission and bring the UAS back under RC control.

RC control - All missions occur with pre-programmed commands providing instructions to the UAS. At all times, a PIC has an RC remote located near the ground control station, with the ability to override the current mission. The AG-130 offers an optional safety feature where in the case that the RC connection is lost, the autopilot software will immediately end the mission and return the UAS home launch location. In this case, the UAS ascends to an altitude set by the PIC in advance of the mission and determined to be safe given the surrounding terrain. The UAS then returns in a straight line to the launch location.

Emergency Kill Switch - An emergency "Kill Switch" allows the operator to instantly stop motors in the event of an emergency. This kill switch is available through the ground control computer telemetry link.

Additional Safety Functions

Additional supplemental safety information is provided below to strengthen the petitioner's position that the proposed UASs can be operated safely in the NAS in accordance with Public Law 112-95, the FAA Modernization and Reform Act of 2012.

Full Black Box Recording of All Flights: Flight data shows time stamped information of all operator control input, GPS statuses and outputs, vibrations, battery voltage, accessory voltages, IMU outputs, compass readings and all other sensor and flight information. All flight information is automatically saved internally on the UAS. Any operator or system caused issues can be easily identified with this information. Hylio's ground control software offers analysis of this log information to help predict potential future problems. As a supplement to routine maintenance, these logs are analyzed daily to help protect the user from unforeseen issues. This process can be completed locally on AgroSol without the need for internet access. If an operator feels there may be an issue, logs from the last flight can be analyzed using AgroSol in minutes without leaving the field.

Safety parameters: Max altitude, distance from home, horizontal speed and vertical speed defaults are set by Hylio Inc., and the customer can set these as well based on location and operating restrictions. The AG-130 uses multiple sensor types to ensure maximum altitude is respected in the event of primary altimeter sensor failure.

Aviation Lighting: All AG-130 come with mounted navigation lights in a standard configuration to indicate orientation and health. Hylio offers optional Long-range visible, high intensity LED strobes.

Intelligent Assisted Launch and Landing: Aircraft uses GPS and IMU data to determine when the craft is fully on the ground, meaning the craft will not shut rotors off until firmly on the ground. Aircraft also uses IMU data to safely and smoothly handle "In Ground Effect" caused by the rotor downwash, which lessens stress and accident likelihood for operator.

Flight Stall Prevention: The flight controller prevents accidental 'throttle zero' motor stall while in the air. In an emergency, the operator can switch instantly to 'manual' mode to activate rotor kill, providing complete system override by the pilot during an in-flight emergency. This override is also available through the ground control station computer over the telemetry link.

10.5-second auto-lock rotors: Automatically locks rotor from accidental turning after initial power connected and again five seconds after rotors stop.

Change of Flight Parameters: Ability to change certain parameters in real-time (during flight).

Flight Controller Modifications: Ability to program, calibrate, debug, and modify flight controller information without power to rotors: allows safe physical interaction with UAS while performing maintenance and servicing.

Return to Home Features: Ability to move or edit "Home" (return to home) location if the original becomes obstructed (animals, people, or too far of a distance, etc.) after initial launch. If a failure occurs, UAS will land at newly designated location.

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

Altitude Sensing Redundancies: The AG-130 uses 3 different sensors to determine altitude. Radar, barometer, and GPS. The radar is the primary source of altitude. If the radar fails, the drone will automatically RTL using barometer altitudes. If the radar fails, the Geofence will also be maintained using the barometer altitude to ensure the UAS does not exit the geofenced area.

Lost Link: If the PIC loses command or control link for a designated length of time, the aircraft will follow a predetermined route to finish the mission, reestablish link, or immediately return to land if the first two options are not possible. The UAS will automatically return when for low battery, or fluid in the tank, even when the link is lost. To ensure operational safety, this feature is optional and can be turned on/off in AgroSol. All safety features including automatic obstacle detection and avoidance remain in effect in the event of a lost link.

Operational Analysis: The AG-130 flight controller firmware automatically logs flight hours on the UAS. These flight hours are tracked and displayed in AgroSol. This automatic flight hour tracking is used to ensure strict adherence to maintenance procedures.

IX. Supporting Documents

In support of this petition, we will submit the following associated documents containing confidential information. The UAS will operate only within the limitations listed in this petition and the supporting documents.

- CONOPS Manual
- Operation and Safety Manual
- Risk Assessment & Mitigation Manual
- Training Manual
- AG-130 Maintenance Manual

These additional confidential documents are not regularly available or being shared with others because they contain specific proprietary information. For these reasons we request they be handled as such under 14 CFR § 11.35(b) and protect them from release under FOIA 5 USC § 552 et seq.

X. Authority to Grant Petition

The Federal Aviation Act gives the FAA the authority to grant exemptions. “The Administrator may grant an exemption from a requirement of a regulation prescribed under subsection (a) or (b) of this section or any sections 44702-44716 of this title if the Administrator finds the exemption in the public interest.” (49 U.S.C. § 44701(f); accord 49 U.S.C. § 44711(b).)

XI. Conclusion

THE COMPANY feels it has presented a thorough and compelling case to grant the relief requested in this petition. UAS operations conducted by THE COMPANY in the manner as outlined above will provide an equivalent level of safety as the current regulations. In order to improve the safety of aerial applications and efficiency of US farmers, THE COMPANY believes it is in the public interest to grant this waiver request without delay.

Sincerely,

Nick Nawratil

THE COMPANY REPRESENTATIVE