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

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

May 11, 2015

Exemption No. 11521
Regulatory Docket No. FAA-2014-0947

Mr. Andrew McCollough
Regulatory Services
SkyWard IO, Inc.
233 Naito Parkway Suite 200
Portland, OR 97204

Dear Mr. McCollough:

This letter is to inform you that we have granted your request for exemption. It transmits our decision, explains its basis, and gives you the conditions and limitations of the exemption, including the date it ends.

The Petitioner Supports its Request with the Following Information

By letter dated November 5, 2014, you petitioned the Federal Aviation Administration (FAA) on behalf of SkyWard IO, Inc. (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct research and development of sUAS and associated sUAS software within defined areas of operations.

See Appendix A for the petition submitted to the FAA describing the proposed operations and the regulations that the petitioner seeks an exemption.

Discussion of Public Comments:

A summary of the petition was published in the Federal Register on December 9, 2014 (79 FR 73133). Four comments were received. The Small UAV Coalition (Coalition) supported the petition, while the Air Line Pilots Association, International (ALPA), the National Agricultural Aviation Association (NAAA), and the United States Hang Gliding and Paragliding Association (USHPA) opposed it.

In support of the petition, the Coalition stated the petitioner has proposed to abide by stronger safety measures than hobby and modeler groups operating similar aircraft. The Coalition stated that it does not believe that heightened safety measures should be required for the petitioner simply because of the commercial nature of its operations. The Coalition urged the FAA to adopt an evaluation framework for UAS operations under Section 333 of Public Law 112–95 that weighs the relative safety issues and risks of UAS by class and operational circumstances, rather than adopting artificial distinctions among unmanned aerial vehicles based on commercial and noncommercial operations. The petitioner's UAS pose considerably less safety risk than larger UAS. The Coalition asserted that because UAS operations like the petitioner's pose minimal risk to safety, they should be subject to minimal and appropriate regulations.

The Coalition noted the FAA is to consider the seven factors[1] in Section 333 as a minimum. The Coalition stated the petition shows the FAA should consider factors other than those specified in Section 333, such as: location, the restricted areas of its small UAV operations, and the petitioner's Safety Management System (SMS). The Coalition maintained that the petitioner's proposed operations satisfy the seven factors in Section 333 and include several additional mitigating factors to ensure the safety and security of the proposed UAS operations. The Coalition emphasized the FAA must evaluate each factor within the context of the petitioner's proposed UAS operations.

The Coalition also commented that the FAA should grant relief from the requirement to hold an airman certificate. The Coalition further stated that if an airman certificate is required then, at a minimum the, FAA should provide an exception from the training and testing requirements in part 61 in favor of requirements pertinent to the aircraft and operation proposed. The Coalition also asserted that in Section 333 Congress intended for the FAA to consider national security with respect to the operation as opposed to addressing it through pilot certification.

The FAA notes that, as discussed in the grant of exemption to Trimble Navigation Ltd. (Exemption No. 11110), neither Section 333, nor the FAA's exemption authority[2] allows the FAA to exempt pilots from the statutory requirement to hold an airman certificate as prescribed in 49 U.S.C. § 44711.

The Coalition commented that a visual observer (VO) should not be required for all small UAS operations. The Coalition further asserted that the presence of one or more VOs may allow the UAS to be operated beyond visual line of sight (VLOS) of the pilot in command

[1] Section 333(b) of P.L. 112–95 states, in part: "In making the determination under subsection (a), the Secretary shall determine, at a minimum-- (1) which types of unmanned aircraft systems, if any, as a result of their size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight do not create a hazard to users of the national airspace system or the public or pose a threat to national security; . . . ."

[2] 49 U.S.C. § 44701(f)

(PIC) and that the petitioner's proposal to operate the unmanned aircraft (UA) within VLOS of the PIC *and/or* VO should be permitted.

The FAA notes that one of the determinations for operations under Section 333 is operation within visual line of sight. The PIC must maintain VLOS while operating the UA. The FAA finds that a VO complements the PIC's capability to see and avoid other aircraft, including when the PIC may be momentarily attending to other flying tasks. The VO provides an additional level of operational safety.

ALPA expressed concern regarding several aspects of the petition. ALPA noted that the proposed operations will take place below 400 feet above ground level (AGL) in Class B, C, D, E, and G airspace, potentially in extremely close proximity to routine manned aircraft operations. ALPA stated, "There must be means both to ensure that the sUAS remains within the defined airspace and to ensure that the hazard of other aircraft intruding on the operation is mitigated."

The FAA believes the limitations under which the petitioner will operate (i.e., VLOS and at or below 400 feet AGL are sufficient mitigations to this risk so that the operations will not adversely affect safety.

ALPA noted that the petitioner does not state how the pilot and the observer will be able to communicate with each other. NAAA stated UAS observers must be present and able to communicate with the operator from the most minimal distance possible. The conditions and limitations regarding PIC and VO communications address those concerns.

ALPA asserted the UA's lithium polymer batteries have numerous associated fire and explosion hazards as outlined in DOT/FAA/AR–09/55, "Flammability Assessment of Lithium-Ion and Lithium-Ion Polymer Battery Cell Designed for Aircraft Power Usage (January 2010)," and that the safe carriage of the batteries and the mitigations in place for known risks should be addressed. The referenced study was primarily conducted to determine how certain battery cells react in a fire situation aboard manned airplanes. Given the size of the battery and the operating conditions of the UAS, the FAA concludes that the use of a lithium polymer battery will not pose an undue safety risk for the proposed operations.

ALPA commented that the petitioner's aircraft does not have a barometric altimeter as required by 14 CFR § 91.121. ALPA stated that processes or mitigations must be in place to ensure the UA can accurately maintain altitude including engineering processes, software development and control, electronic hardware development and control, configuration management, and design assurance to ensure the aircraft and its control system(s) operate to the same level of safety as other aircraft operated commercially in the National Airspace System (NAS).

ALPA commented that command and control (C2) link failures are one of the most common failures on a UAS, and that lost link mitigations should require safe modes to prevent

flyaways or other scenarios. The FAA has inserted conditions and limitations in this exemption to mitigate the risk associated with such failures.

ALPA contended the sUAS pilot must hold at least a current FAA commercial pilot certificate with an appropriate category and class rating for the type of aircraft being flown, as well as specific and adequate training on the UAS make and model intended to be used. Similarly, ALPA asserted a current second-class airman medical certificate should be required. NAAA also commented on pilot qualification, stating—

> Just as manned aircraft pilots are required to undergo a rigorous training curriculum and show that they are fit to operate a commercial aircraft, so too must UAS operators. Holding a commercial certificate holds UAS operators to similar high standards as commercial aircraft operators and ensures they are aware of their responsibilities as commercial operators within the NAS. Medical requirements ensure they have the necessary visual and mental acuity to operate a commercial aircraft repeatedly over a sustained period of time.

The FAA has reviewed the knowledge and training requirements of sport, recreational, private and commercial certificates and concluded that a UAS PIC holding a minimum of a sport pilot certificate, and operating under this exemption, would not adversely affect operations in the NAS or present a hazard to persons or property on the ground.

ALPA noted the petitioner must specify a means to meet see and avoid requirements in § 91.113 given the absence of an onboard pilot. The FAA notes that all flights must be operated within VLOS of the PIC and VO.

ALPA noted the petitioner requested an exemption to the entirety of 14 CFR Part 61. Specifically, ALPA expressed concern that the petition makes no reference to compliance with 14 CFR § 61.195, *Flight instructor limitations and qualifications*, which defines the requirements for flight instructors. A certificated flight instructor is authorized to provide the instruction required for the certificates or ratings or currency listed in 14 CFR § 61.193. A person instructing on how to operate the UAS under the petitioner's training program would not need to be a certificated flight instructor because the instruction is not being provided for a certificate or rating listed in § 61.193. We note that none of the UAS operations proposed by the petitioner require such flight instruction because § 61.31(*l*) allows for operation of the UAS by an airman who is current per 14 CFR § 61.56 without a category and class rating. Instruction provided toward obtaining the pilot certificate required by this exemption would need to be provided by a certificated flight instructor.

Regarding the petitioner's request for exemption from the minimum safe altitude and transponder requirements of 14 CFR §§ 91.119 and 91.215, ALPA argued all aircraft in the NAS must operate to the same high level of safety. ALPA asserted this includes the maintenance of a safe altitude for both airplanes and helicopters, and the use of transponders and altitude reporting equipment.

Regarding the fuel requirements of § 91.151, ALPA argued that using batteries as the only source of an aircraft's power is a substantial shift from traditional methods of propulsion, and requires further research to determine best safety practices. This comment is addressed in detail below.

ALPA opposed the petitioner's request for an exemption from the aircraft maintenance and record keeping requirements. ALPA asserted that the petitioner's small UAS "should comply to the same level of safety as other aircraft operated commercially in the NAS." The FAA finds that adherence to the petitioner's operating documents, as required by the conditions and limitations below, is sufficient to ensure that safety is not adversely affected.

ALPA also expressed concern that the petitioner's request is not for a single specific operation or location, but for all operations of the same general type. ALPA stated that this results in a considerable increase in the FAA's oversight tasks. The FAA notes ALPA's concern and in order to minimize potential impact to the NAS, the FAA requires that each operator secure a Certificate of Waiver or Authorization (COA) which covers specific details of the petitioner's operation. The FAA recognizes that UAS integration will generate new NAS access demand and will review and adjust accordingly.

NAAA noted that its members operate in low-level airspace, and therefore clear low-level airspace is vital to the safety of these operators. NAAA stated that seeing and avoiding other aircraft and hazardous obstructions is the backbone for agricultural safety, and that agricultural pilots depend on pilots of other aircraft to perform their see-and-avoid functions to prevent collisions. NAAA believes UAS operations at low altitudes will increase the potential for collision with agricultural aircraft.

The FAA recognizes these concerns and has incorporated associated conditions and limitations into this exemption, including: (a) a Notice to Airmen (NOTAM) issued for all operations; (b) operations conducted within VLOS of the pilot in command (PIC) and the VO; and (c) the UAS PIC must always yield right-of-way to manned aircraft.

NAAA stated that FAA airworthiness certification should be a requirement for all unmanned aircraft to operate within the NAS. NAAA recommended UAS be equipped with ADS–B or similar identification and positioning systems, strobe lights, high-visibility markings and registration numbers. NAAA also recommended UAS be operated strictly within the line-of-sight of the ground controller, with the assistance of a VO and clear of any low-flying manned aircraft.

As discussed in greater detail below, Section 333 of the FAA Modernization and Reform Act of 2012 authorizes the Secretary of Transportation to determine, considering a number of factors laid out in the statute, that an airworthiness certificate is not necessary for certain operations. The Secretary has made that determination in this case and therefore the aircraft operated by the petitioner will not need to be certificated by the FAA.

The USHPA stated they disagree that granting exemptions would enhance safety and fulfill the Secretary of Transportation's statutory obligation to establish requirements for the safe operation of sUAS in the NAS. In support of this statement, USHPA discussed issues related to sUAS proximity to ultralight flight activities, lack of sense and avoid capabilities, and operator visibility limitations, such as limited depth perception. The USHPA argued in favor of limiting operations to VLOS, requiring NOTAM issuance, pilot and UAS certification, and category level training requirements.

Airworthiness Certification

The UAS proposed by the petitioner are:

- DJI Spreading Wings S10001
- 3D Robotics X82
- 3D Robotics Iris3
- DJI Phantom 24
- DJI Phantom 2 Vision Plus5

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*. In accordance with the statutory criteria provided in Section 333 of Public Law 112−95 in reference to 49 U.S.C. § 44704, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that the requested relief from 14 CFR part 21 and any associated noise certification and testing requirements of part 36, is not necessary.

The Basis for Our Decision

You have requested to use a UAS for research and development related to the production of data and aerial data collection.[3]

The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grants of Exemption Nos. 11062 to Astraeus Aerial (*see* Docket No. FAA−2014−0352), 11109 to Clayco, Inc. (*see* Docket No. FAA−2014−0507), 11112 to VDOS Global, LLC (*see* Docket No. FAA−2014−0382), and 11213 to Aeryon Labs, Inc. (*see* Docket No. FAA−2014−0642), the FAA found that the enhanced safety achieved using an unmanned aircraft (UA) with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater

[3] Aerial data collection includes any remote sensing and measuring by an instrument(s) aboard the UA. Examples include imagery (photography, video, infrared, etc.), electronic measurement (precision surveying, RF analysis, etc.), chemical measurement (particulate measurement, etc.), or any other gathering of data by instruments aboard the UA.

proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

Except as noted below, having reviewed your reasons for requesting an exemption, I find that—

- They are similar in all material respects to relief previously requested in Grant of Exemption Nos. 11062, 11109, 11112, and 11213;
- The reasons stated by the FAA for granting Exemption Nos. 11062, 11109, 11112, and 11213 also apply to the situation you present; and
- A grant of exemption is in the public interest.

Your petition and supporting materials inferred the potential for the carriage of light-weight inert payloads (e.g. antibiotics, or other medical supplies, documents, etc.). Transport of property for compensation or hire, whether common carriage, non-common carriage, or private carriage, requires an appropriate air carrier commercial operator certificate. This exemption does not provide such a certificate. As specified in condition and limitation number 3, operations for the carriage of property for compensation or hire are not permitted.

Our Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701, delegated to me by the Administrator, SkyWard IO, Inc. is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the extent necessary to allow the petitioner to operate a UAS to perform research and development of sUAS and associated sUAS software within defined areas of operations for the purpose of the production of data and aerial data collection. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, SkyWard IO, Inc. is hereafter referred to as the operator.

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

1. Operations authorized by this grant of exemption are limited to the DJI Spreading Wings S10001, 3D Robotics X82, 3D Robotics Iris3, DJI Phantom 24, and the DJI Phantom 2 Vision Plus5, when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.

2. Operations for the purpose of closed-set motion picture and television filming are not permitted.

3. Operations for the carriage of property for compensation or hire are not permitted.

4. The UA may not be operated at a speed exceeding 87 knots (100 miles per hour). The exemption holder may use either groundspeed or calibrated airspeed to determine compliance with the 87 knot speed restriction. In no case will the UA be operated at airspeeds greater than the maximum UA operating airspeed recommended by the aircraft manufacturer.

5. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL). Altitude must be reported in feet AGL.

6. The UA must be operated within visual line of sight (VLOS) of the PIC at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license. The use of First Person View (FPV) or similar device is not permitted.

7. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the duties required of the VO.

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 operating documents must be accessible during UAS operations and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents, the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operating documents. The operator may update or revise its operating documents. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator or any law enforcement official upon request. The operator must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption. If the operator determines that any update or revision would affect the basis upon which the FAA granted this exemption, then the operator must petition for an amendment to its grant of exemption. The FAA's UAS

Integration Office (AFS−80) may be contacted if questions arise regarding updates or revisions to the operating documents.

9. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics, e.g. replacement of a flight critical component, must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.

10. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.

11. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the UAS is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, e.g. inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.

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

13. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.

14. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

15. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. PIC qualification flight hours and currency must be logged in a manner consistent with 14 CFR § 61.51(b). Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building) and determining the PIC's ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption are permitted under the terms of this exemption. However, training operations may only be conducted during dedicated training sessions. During

training, proficiency, and experience-building flights, all persons not essential for flight operations are considered nonparticipants, and the PIC must operate the UA with appropriate distance from nonparticipants in accordance with 14 CFR § 91.119.

16. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.

17. The UA may not operate within 5 nautical miles of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD) or for airports not denoted with an ARP, the center of the airport symbol as denoted on the current FAA-published aeronautical chart, unless a letter of agreement with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.

18. The UA may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.

19. 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.

20. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.

21. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UA to conduct the intended operation and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater.

22. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.

23. 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 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.

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 nonparticipating persons, vessels, vehicles, and structures unless:
    a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner ensuring the safety of nonparticipating persons; and
    b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

    The PIC, VO, operator trainees or essential persons are not considered nonparticipating persons under this exemption.

28. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.

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 to the FAA's UAS Integration Office (AFS−80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

If this exemption permits operations for the purpose of closed-set motion picture and television filming and production, the following additional conditions and limitations apply.

30. The operator must have a motion picture and television operations manual (MPTOM) as documented in this grant of exemption.

31. At least 3 days before aerial filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local Flight Standards District Office (FSDO) with jurisdiction over the area of proposed filming. The 3-day notification may be waived with the concurrence of the FSDO. The plan of activities must include at least the following:
    a. Dates and times for all flights;

b. Name and phone number of the operator for the UAS aerial filming conducted under this grant of exemption;
c. Name and phone number of the person responsible for the on-scene operation of the UAS;
d. Make, model, and serial or N−Number of UAS to be used;
e. Name and certificate number of UAS PICs involved in the aerial filming;
f. A statement that the operator has obtained permission from property owners and/or local officials to conduct the filming production event; the list of those who gave permission must be made available to the inspector upon request;
g. Signature of exemption holder or representative; and
h. A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which filming will be conducted and the altitudes essential to accomplish the operation.

32. Flight operations may be conducted closer than 500 feet from participating persons consenting to be involved and necessary for the filming production, as specified in the exemption holder's MPTOM.

Unless otherwise specified in this grant of exemption, the UAS, the UAS PIC, and the UAS operations must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 61, and 91.

This exemption terminates on May 31, 2017, unless sooner superseded or rescinded.

Sincerely,

/s/
John S. Duncan
Director, Flight Standards Service

Enclosures

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November 5, 2014

RE: SkyWard IO sUAS Airworthiness Exemption Petition for FMRA Sec 333 Exemption

Gentlemen:

SkyWard IO, Inc. ('SkyWard') hereby petitions the FAA for regulatory relief pursuant to Section 333 of P.L 112–95 333 and 14 C.F.R. Sec. 11.81 to conduct commercial flights with SkyWard sUAS and to pursue research and development of the those sUAS and associated sUAS software within defined areas of operations, secured according to the SkyWard procedures, in the national airspace (NAS). Attached, therefore, is a request for exemption from airworthiness and specific Title 14 C.F.R. sections for the types of sUAS and sUAS operations described in this Section 333 exemption petition.

SkyWard is a software platform developer and operational infrastructure provider dedicated to developing flight systems, fleet management systems, and operations processes for the safe deployment of sUAS in the NAS. This petition seeks authorization to operate the SkyWard sUAS described in this petition within restricted access areas. These areas of operations, similar to the "closed set" areas described in Exemption No. 11062, will be defined and submitted for approval prior to operations. Generally, SkyWard sUAS operations will be below an altitude of 400 ft. AGL, within specific access-restricted areas, within Class G airspace, with the permission of the flight service station, using sUAVs operated by SkyWard qualified sUAS pilots, and within visual line of sight of the operator or observer. The UAVs contemplated in this proposal are of small size and weight (less than 55 lb.), capable of relatively slow speeds (top speed of a UAV to be deployed under this petition is less than 50 kt.) and, as demonstrated in this petition, do not pose a threat to the safety of the NAS, persons on the ground, or national security.

This exemption seeks authorization to conduct commercial and R&D flights according to the terms of this petition and the SkyWard Omnibus General Operations Manual ('SkyWard Manual') which is composed of (1) an operations manual, (2) flight manuals for each of the SkyWard fleet sUAS by make and model; (3) an Operator Training Manual, and (4) a Maintenance and Inspection Manual.

Please note that the SkyWard Manual (including all of the above listed components) are all clearly marked "Confidential" on each page, and contain confidential commercial and proprietary information that SkyWard has not and will not share with others who are not subject to a "Nondisclosure Agreement" (NDA). Therefore, the SkyWard Manual (including all components) are not available to the public and contain operating conditions, procedures and other information that is not available to the public and that are protected from public release or disclosure under the Freedom of Information Act 5 USC Sec. 552 et seq.

Why we require an exemption

Commercial Operation

An exemption is required because current FAA regulations do not allow for the commercial use of sUAS lacking airworthiness certificates in the NAS. SkyWard requests an airworthiness exemption for the specific types of sUAS described in this petition to carry both active payloads including sensor packages, e.g. film and video equipment, and light-weight inert payloads (e.g. antibiotics, or other medical supplies, documents, etc.), under the conditions and operating limitations outlined below and described in the SkyWard Manual.

Research and Development

SkyWard develops operational, navigational, and fleet management software for commercial sUAS so that they may fly safely and predictably in the NAS. In order to develop and test the software for these sUAS under the variety of operational conditions a sUAS will face in the NAS, it is necessary to test various sUAS and sUAS configurations, operating systems, and management systems in different environments. FAA Order 8130.34C for a Special Airworthiness Certificate: Experimental Category does not authorize the necessary variable aircraft characteristics and systems to meaningfully test the responsiveness of these sUAS to the capricious influences affecting the NAS.

Therefore, to gain the meaningful data about sUAS features necessary for developing a program for safe and efficient sUAS operations, an exemption is required that authorizes R & D: 1) across a range of sUAS makes, models and prototypes, 2) in a variety of locations (subject to the restrictions outlined in this petition), and 3) for iterating on the systems and airframes on an ongoing basis. Without this exemption the regulatory requirements for a Special Airworthiness Certificate, Experimental Category (SAC-EC) are overly burdensome because they forbid the necessary R & D, i.e. rapid iterations on prototypes. Finally, as the FAA is well aware, the SAC-EC does not authorize commercial operations of the type described above; which are required for SkyWard research and development.

The types of sUAS for which SkyWard requests exemptions

SkyWard is developing a class of sUAS that are designated "Low-Energy small Unmanned Aerial Vehicles" ("LE sUAS"). These LE sUAS are approximately equivalent to the Air Force designated "Micro UAS" class of UAS. Specifically, LE sUAS are those sUAS which are small (< 2 meter in largest dimension), light-weight ($\sim$ 55 lb. or less), slow-moving ($\sim$50 kt.) and operate close to the ground ($<$ 400 ft. AGL). We believe that these LE sUAS and associated SkyWard operation and management systems meet the standard provided by Section 333 of the FMRA for a UAS to operate safely within the National Airspace prior to the completion of FMRA's required rule-making. Section 333 describes seven minimum criteria to determine whether an sUAS may operate safely in the NAS without creating a hazard or posing a threat to national security. These criteria comprise

size, weight, speed, operational capability, operation in close proximity to airports, operation in close proximity to people, and operation within visual line of sight. SkyWard's proposed LE sUAS are of a type and scale that meet these criteria and that are equivalent to those for which FAA has recently granted Sec 333 exemptions and, similarly, are not anticipated to create a hazard to users of the National Airspace System ("NAS"), persons on the ground, or pose a threat to national security. Basic characteristics of the SkyWard proposal are summarized below.

Table 1: Section 333 Determinants and LE sUAS

Criterion	SkyWard LE sUAS and Operations
1. Size	Under 2m largest dimension
2. Weight	Less than 55 lb. maximum takeoff weight
3. Speed	Velocity not to exceed 50 kt. or 25.7 m/s.
4. Operational Capability	Day VFR, with ∼30 minutes of flight time.
5. Operation of the UAS in close proximity to airports	At least 5 miles from airports or with explicit ATC approval.
6. Operation in close proximity to populated areas	Operated over property with consent of owner. Exclusion of non-participants from area of operations.
7. Operation in visual line of sight.	Operated with direct visual contact by PIC or Observer.

In addition to the LE sUAS operational requirements listed above and, in order to further mitigate risk, each SkyWard sUAS will be equipped with a pilot-controlled precautionary landing system (PLS) capable of landing the sUAS in the event of an unrecoverable C2 lost-link or other exigent eventuality. The PLS is composed of a separate, redundant circuit and radio control link that is directly operated by the PIC and independent of the other flight control systems, a hard (not software-based) power disconnect, and a parachute deployment system. The PIC may therefore terminate the flight by remotely disconnecting power from the system and deploying the parachute. The PLS system is described in detail in the SkyWard Operations Manual.

Comparison to Ultralight Aircraft

14 CFR Part 103 "Ultralight Vehicles" describes the applicability, inspection requirements, waivers, certification and registration requirements, as well as operating rules, for another class of aircraft that are the closest comparable aircraft to sUAS currently in the NAS. Ultralights are defined, in part, as a single-occupant manned aircraft that weigh less than 254 lb. empty weight, carries no more than 5 gallons (∼41 lb.) of fuel, and has a maximum speed of 55 kt. The FAA has determined that these aircraft require no airworthiness certificate or inspection; that ultralight pilots require no pilot certifications nor medical certification, despite flying in the NAS; and that ultralights are not required to be registered or to bear markings or any kind. In addition, the operational rules in 103 Subpart B are equivalent to, or even less stringent than, those that SkyWard is proposing for our LE sUAS operations. Please see Ultralight and LE sUAS Comparison (Table 2) below.

A significant difference between ultralights and LE sUAS as is, of course, the presence of a pilot on board the ultralight. While this may decrease the risk of C2 loss event, in case of other catastrophic events the pilot is at risk. LE sUAS are unmanned and thus the risk to the pilot is removed, and as described above and in the SkyWard Manual, C2 loss-link risks are mitigated. Thus, given the pilot training, speed, weight, airspace limitations, and other risk mitigation measures proposed by SkyWard, LE sUAS simply do not pose additional hazard to the national airspace, persons, property, or national security. A risk-based approach to determining LE sUAS safety, as outlined in the FMRA 2012 Section 333, clearly indicates that the SkyWard LE sUAS are less hazardous than some existing aircraft in the NAS.

Table 2: Ultralight and LE sUAS Comparison

Item	Ultralight Rules	SkyWard LE sUAS Rules
Pilot	No certification required	Pilot Ground School, SkyWard operator qualification and currency
Weight	294 lb. (including fuel) + pilot	55 lb.
Speed	55 kt.	55 kt.
Registration	No registration	Registration with AIR–200
Airworthiness	No requirement for certification.	Airworthy according to manufacturer standards and SkyWard technicians.
Operating Rules		
Airspace	Class B,C, and D, with ATC approval. Class E and G.	Class B,C, and D with ATC approval. Class G.
Altitude limits	None	Below 400 ft. AGL
Daylight	Day VFR	Day VFR
Populated areas	Not over congested areas.	Not over congested areas.

Priority Safety Issues

Priority safety issues and resolution strategies are outlined in the SkyWard Manual. These include LE sUAS reliability and safe operations, Command and Control lost-link, and "See and Avoid" (also known as "Detect and Avoid" in the context of UAVs) requirements.

Reliability, Safety and Operation of LE sUAS:

Operations in Class G airspace below 400 ft AGL 5 Miles or More From an Airport The region of operations for LE sUAS is below 400 ft AGL, in Class G airspace and 5 miles or more from an airport or otherwise in coordination with the FSDO and ATC. The airspace used will be wholly with the underlying property owner's written consent. Aircraft separation will be accomplished by flying under VFR rules during the day with a pilot and an observer both of whom are qualified according to the SkyWard Manual. See Pilot Requirements (section). In addition, the SkyWard Manual details fail-safe mechanisms including a recovery parachute, return to home, slow descent and auto-land.

Operations in controlled Airspace (B, C, D), Below 400 Ft. AGL This region of operation of LE sUAS is below 400 ft AGL, in Class B, C, and D airspace. Two-way communication with ATC will be established before operations commence or before the sUAS enters controlled airspace. These operations will be wholly with the underlying property owner's written consent. Aircraft separation will be accomplished by flying under VFR rules during the day with a pilot and an observer, both of whom are qualified and current according to the SkyWard Manual. See Pilot Requirements (section). In addition, the SkyWard Manual details fail-safe mechanisms including a recovery parachute, return to home, slow descent and auto-land.

Command and Control (C2) link failure modes, mitigation strategies. In addition to the locational protections outlined above, lost link mitigation is achieved by redundant failure operation, auto-land, return-to-home, geo-fencing, and parachute deployment to reduce the probability and mitigate the severity of a C2 failure. Risk assessment and mitigation procedures for spectrum

interference, as well as weather, obstacles, and unforeseen events, are detailed in the SkyWard Manual.

14 CFR Sec. 91.113 Right of Way, See and Avoid Requirements Mitigation for reduced "See and Avoid" capability is that all proposed operations under this petition are at 400 AGL and below. In this near-surface airspace, the only other legally operating aircraft are other approved UAVs or those operating with a special use certificate (Life Flight, fire watch contractors etc.) Further risk mitigations include a PIC will be monitoring all UAS operations, and a visual observer, both qualified according to the SkyWard Manual, will be employed for all UAV flight operations to avoid aerial conflicts. Further, the proposed UAVs will fly only within visual line-of-sight of the PIC and an observer, under VFR conditions, and during daylight hours. We believe that types of LE sUAS and operations together with the protocols and characteristics outlined in this petition and detailed in the accompanying SkyWard Manual maintain the current high level of safety in the NAS.

Pilot Requirements

In accordance with the knowledge requirements in Exemption No. 11062, and as described in detail in the SkyWard Manual10, a SkyWard Pilot in Command (PIC) must:

- Be qualified and current according to the SkyWard Manual and passed the Private Pilot FAA Ground School knowledge test.
- Have flown and logged a minimum of 200 flight cycles and 25 hours of total time as a sUAS pilot for a given category of sUAS (rotorcraft or fixed-wing) and at least 10 hours logged as a sUAS pilot with a similar UAS type (single blade or multi-rotor).
- Have flown and logged a minimum of five hours as UAS pilot with the make and model of the SkyWard sUAS as well as three take-offs and landings in the preceding 90 days.

Documentation for pilot and observer qualification 12 and currency will be maintained as per the SkyWard Operating Manual13 and will be available upon the FAA's request.

Information Supporting this Petition as Specified in 14 C.F.R. Sec. 11.81

This section responds to the specific requirements of 14 CFR Sec 11.81. The attached Exhibit A "Information Supporting Petition" presents an analysis of 8130.34C and ancillary CFRs to demonstrate either direct compliance or alternative method of compliance for each regulatory exemption requested.

(a) Mailing address and other contact information such as a fax number, telephone number, or email address copy.

SkyWard IO, Inc.
ATTN: Andrew McCollough
Regulatory Services
233 Naito Parkway
Portland, OR 97204
Email: exemption@skyward.io

(b) The specific section or sections of 14 C.F.R. from which SkyWard seeks an exemption

§ 91.203 Airworthiness certificates
§ 47.16 Temporary registration numbers
§ 91.121 Altimeter settings
§ 91.203(a) Airworthiness certificate with registration number (within the aircraft)
§ 91.203(b) Display of airworthiness certificate
§ 91.9(b,c) Manual, marking, and placards
Part 43 Inspection and maintenance programs;
§91.405 Maintenance required;
§91.407 Operation after maintenance, preventive maintenance, rebuilding, or alteration;
§91.409 Inspections;
§91.417 Maintenance records
Part 45 Registration and marking special rules
Part 21 (Subpart H) Airworthiness certificate; Experimental certificate - general
§61 Requirements for certification of instructors for crew training
§91.119 Minimum safe altitudes: General
§91.413 ATC transponder tests and inspections
§91.215 ATC transponder and altitude reporting equipment and use
§67 Medical standards and certification
§91.109 Flight instruction; Simulated instrument flight and certain flight tests
§91.151 Fuel requirements for flight in VFR conditions

(c) The extent of relief SkyWard seeks, and the reason SkyWard seeks the relief

A Section 333 exemption is required because current FAA regulations do not allow commercial use of sUAS in the NAS, or for appropriate research and development of sUAS. SkyWard requests an airworthiness exemption for the specific types of sUAS described in this petition to carry inactive and active payloads, e.g. sensor packages for commercial applications such as videography and precision agriculture and light-weight inert packages, under the conditions and operating limitations outlined below and described in the SkyWard Manual. In addition, SkyWard is developing sUAS and sUAS software, including operational, navigational, and management software for small commercial UAVs, so that sUAV may fly safely and predictably in the NAS. In order to develop and test these sUAS under the variety of operational conditions that a sUAS will face in the NAS, it is necessary to test variations on aircraft characteristics, operating systems, and management systems in different environments. FAA regulations in FAA Order 8130.34C for a Special Airworthiness Certificate: Experimental Category do not authorize the necessary rapid modifications of aircraft characteristics and associated systems to test these sUAS.

Therefore, to gain meaningful data about the necessary features for safe and efficient sUAS operations, an exemption is necessary : 1) to operate a range of sUAS makes, models and prototypes, 2) in a variety of locations (subject to the restrictions outlined in this petition), 3) to be permitted to adjust the systems and airframes tested on an ongoing basis, and 4) for both research and commercial use. Finally, as the FAA is well aware, the exemption is necessary because the SAC-EC does not authorize commercial operations of the type sought here, which is required for SkyWard to develop accurate data about the types of sUAS that are best suited for safe operations in the various conditions affecting the NAS.

(d) The reasons why granting SkyWard's request would be in the public interest; that is, how it would benefit the public as a whole

The proposal is designed to establish a reasonable methodology to test specific types and platforms of sUAS, in a variety of environments and to enable the safe and efficient deployment of commercial sUAS. The outputs of safe, reliable, and regulatory compliant operations of sUAS provide economic benefits historically unparalleled since the invention of flight, benefitting stakeholders at every level, both public and private. Lawful, safe aerial robotics operations will create new high-tech employment that will stimulate city and state governments; create new small and large businesses; infuse new interest in STEM for children; and increase the safety of citizens through enhanced first-responder capabilities. Grant of this petition would enable the research and operational development of necessary industry infrastructure to enable the safe and efficient acceleration of these significant public benefits to the United States public.

(e) The reasons why granting the exemption would not adversely affect safety, or how the exemption would provide a level of safety at least equal to that provided by the rule from which SkyWard seeks the exemption

SkyWard operations will provide a level of safety that is equivalent to current aviation standards. SkyWard's safety procedures, risk assessments, and flight operations standards are described in detail in the accompanying SkyWard Operations Manual. In brief, the following procedures that apply during operations conducted under this exemption request, establish an equivalent level of safety (ELOS) as follows:

1. The SkyWard LE sUAS are less than 55 pounds and are battery powered.
2. All SkyWard LE sUAS will be U.S. registered and display marks either in accordance with 14 C.F.R. Part 45, Subpart C or approved alternative markings.
3. SkyWard sUAS operations under this exemption will be conducted within the visual line of sight of the pilot operator or least one observer, at less than 400 feet AGL, in coordination with the FSDO, within Class G airspace and with the permission of the flight standards service station or other local authority, as applicable. Operations in controlled B,C, or D airspace will be conducted in coordination with FSDO and ATC with prior permission.
4. SkyWard operations will be conducted in defined regions and over property authorized for this use by the landowner. Consistent with the recently issued Section 333 Exemption No. 11062 (Astraeus Aerial), the area of operations will be submitted for approval to the local FSDO and will be subject to any restrictions or conditions imposed by the FSDO. Class G airspace operations will also be subject to the express written approval of the Flight Service Station. All operations will remain within the geographic boundaries of the operating area.
5. LE sUAS operations under this exemption will be conducted under the supervision of a designated pilot in command (PIC) who has final responsibility for the operation and in accordance with 14 C.F.R. 91.3. See the Pilot Requirements section below. All LE sUAS operators and observers must have completed training on the normal, abnormal, and emergency procedures in the SkyWard Manual, demonstrated proficiency with the sUAS being operated, and passed the Private Pilot FAA Ground School knowledge test.

6. Operators and engineers will maintain the LE sUAS system in a condition for safe operation according to the SkyWard Manual and associated manufacturer's maintenance manuals, including pre-flight and post-flight inspections.
7. The PIC and observers will maintain situational awareness and perceive, process, and perform risk management prior to and during each operation as described in the SkyWard Manual. The PIC will terminate the operation in accordance with the SkyWard Manual if hazards that cannot be acceptably mitigated are observed.
8. LE sUAS will safely stop operating and either return home or auto-land at a location along the flight path if the control link is lost.
9. For each LE sUAS, the PIC will have the ability to force a controlled landing at any time or to deploy the parachute for an emergency landing.

In addition to the above, SkyWard has implemented a Safety Management System. The SkyWard Safety Manager is responsible for conducting safety audits, investigations, and inspections and is authorized to stop or prohibit any activity or operations which is considered unsafe. Full details are available in chapter 6 of the SkyWard Manual.

(f) A summary FAA can publish in the FEDERAL REGISTER, stating: (1) The rule from which you seek the exemption; and (2) A brief description of the nature of the exemption you seek.

Petitioner: SkyWard IO, Inc.
Sections of 14 C.F.R 21; 45.23(b); 91.9(b); and 91.203(a) and (b) and ancillary sections. Description of Relief Sought: Petitioner seeks to be exempt from the requirements of 14 C.F.R. Part 21(Subpart H), § 91.121, §21.193, §91.203, §91.319, §91.119; §91.413; §91.215, §91.155, §91.109, §91.111, §91.113, §91.115, §91.151; §91.203(a); §91.203(b), §91.9(b,c); part 43; §45.11, §45.21, §45.22(d); §47.16, part 49, part 61, and part 67. Skyward requests this regulatory relief in order to conduct R&D and commercial use for a class of sUAS over private and public property subject to operating procedures that meet an equivalent level of safety as those that FAA requires for similar operations in manned aviation.

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

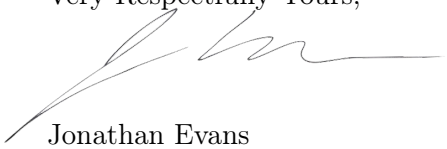
Please see the introduction to this exemption request and the attached "Exhibit A: Information Supporting Petition."

(h) If you want to exercise the privileges of your exemption outside of the United States, the reason why you need to do so. Some SkyWard partners and clients operate manufacturing and testing facilities outside the United States. Nonetheless, SkyWard pilots operating in any jurisdiction will operate according to the standards promulgated by the FAA and the restrictions outlined here and in the SkyWard manual.

SkyWard seeks this exemption to conduct commercial operations and supporting R&D of sUAS within specified areas in the NAS. Without this exemption, sUAS innovation will be suppressed, the public economic benefits derived from increased sUAS development will be denied, and the Congressional directive to accelerate the integration of UAS into the NAS will be impeded. SkyWard LE sUAS physical and operational characteristics are compliant with those described in the FMRA and FAA's guidance for Sec 333 exemptions. SkyWard respectfully requests that the FAA grant its petition for exemption from airworthiness, COA, and COW requirements.

Please do not hesitate to contact Andrew McCollough, the Regulatory Services POC, via email at exemption@skyward.io if you have any questions or concerns.

Very Respectfully Yours,



Jonathan Evans
SkyWard CEO