



Jonathan Evans
SkyWard CEO

SkyWard IO, Inc.
233 Naito Parkway Suite 200
Portland, OR 97204
Tel (971) 303-9981

The Honorable Anthony R. Foxx
Office of the Secretary
US Department of Transportation
1200 New Jersey Ave., SE
Washington, DC 20590

The Honorable Michael P. Huerta
Office of the Administrator
Federal Aviation Administration
800 Independence Avenue SW
Washington, DC 20591

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 (~ 55 lb. or less), slow-moving (~ 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.
<hr/>		
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 qualification¹² 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

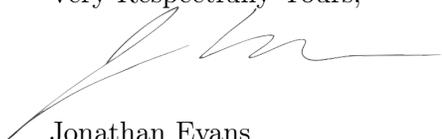
Please see the introduction to this exemption request and the attached "Exhibit A: Information Supporting Petition."

(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,

A handwritten signature in black ink, appearing to read 'Jonathan Evans', written over a thin horizontal line.

Jonathan Evans
SkyWard CEO