Exemption No. 16341

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

In the matter of the petition of **Industrial Skyworks** (USA), Inc. for an exemption from part 21 and §§ 91.113, 91.119(c), 91.151, 91.203(a)(1), 91.209, 91.405(a) and (b), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) of Title 14, Code of Federal Regulations	**Regulatory Docket No. FAA−2014−1060**

GRANT OF EXEMPTION

By letters dated December 15, 2014, March 17, 2015, and June 22, 2015, Mr. Kenneth Quinn, Pillsbury Winthrop Shaw Pittman LLP, on behalf of Industrial Skyworks (USA), Inc. (Skyworks) (hereinafter petitioner or operator), 1200 Seventeenth Street NW, Washington, DC 20036, petitioned the Federal Aviation Administration (FAA) for an exemption from part 21, and §§ 91.113, 91.119(c), 91.151, 91.203(a)(1), 91.209, 91.405(a) and (b), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) of Title 14 Code of Federal Regulations (14 CFR). The exemption would allow the petitioner to operate the Aeryon Scout unmanned aircraft system (UAS) to conduct daytime operations and the Aeryon SkyRanger ("SkyRanger") UAS, to conduct daytime and nighttime building inspections.

The petitioner supports its request with the following information:

The petition for exemption describing the proposed operation and the regulations from which the petitioner seeks exemption is posted to the docket. To view the petition, visit http://www.regulations.gov, enter the regulatory docket number found on the first page of this document into the search box and click "Search," then click on the "Open Docket Folder" link next to a result associated with the docket number.

The petitioner has provided the following information along with its petition via confidential submission to the FAA to support its request for an exemption:

1) Industrial Skyworks Company Operations Manual
2) Industrial Skyworks Standard Operating Procedures
3) ISW Safety Case for sUAS Operations at Night
4) Industrial Skyworks, Exemption Request Supplement Appendix A
5) Industrial Skyworks, Exemption Request Supplement Appendix B
6) Aeryon Scout User's Manual
7) Aeryon SkyRanger User's Guide

The petition and the documents above are hereinafter referred to as the operating documents.

Discussion of Public Comments:

A summary of the petition was published in the Federal Register on June 22, 2015 (80 FR 35693). One comment was received from the Small UAV Coalition (Coalition) supporting the petition.

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 Pub. L. 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. According to the Coalition, 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 altitude of its small UAV operations, proven experience pursuant to Certificates of Authorization in the United States and similar approvals

[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; . . . ."

in Canada. 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 exempt pilots from the statutory requirement to hold an airman certificate as prescribed in 49 USC § 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 (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 requirements of operations under section 333 is that the UAs be operated within visual line of sight of the PIC. 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.

The FAA's analysis is as follows:

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

[2] 49 USC § 44701(f)

Unmanned Aircraft System (UAS)

The petitioner proposed using two aircraft in its operations. The Aeryon Scout UAS would be used for daytime operations and the Aeryon SkyRanger UAS would be used for both daytime and nighttime operations. The Aeryon SkyRanger UAS is equipped to inform the PIC of the location and altitude of the aircraft and has lights that can be seen at night from 5000 feet.

Regarding, 14 CFR part 21, *Certification procedures for products and parts*. In accordance with the statutory criteria provided in Section 333 of PL 112-95 in reference to 49 USC 44704, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and their operation, the Secretary of Transportation has determined that these aircraft meet the conditions of Section 333 and that an airworthiness certificate is not required. 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 petitioner requested relief from the following sections 14 CFR §§ 91.405(a) *Maintenance required*, 91.407(a)(1) *Operation after maintenance, preventive maintenance, rebuilding, or alteration*, 91.409(a)(2) *Inspections*, and 91.417(a) and (b) *Maintenance records*. The FAA has determined that relief from § 91.409(a)(1) is also necessary, because it is an alternate inspection requirement of 91.409(a)(2). Prior UAS specific relief has been granted in Grant of Exemption No. 13465A, Kansas State University. Therefore the FAA finds that exemption from 14 CFR §§ 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b) is warranted subject to the conditions and limitations below.

Additionally, we have added a condition to this exemption stating that, consistent with existing law, the operator will need to obtain a Foreign Aircraft Permit pursuant to 14 CFR § 375.41 if it will be using foreign civil aircraft[3] in its operations.

UAS Pilot in Command (PIC)

The petitioner proposed that its pilots would be able to operate safely because they would: (1) hold an FAA commercial pilot certificate and second class medical certificate and (2) have completed the petitioner's training program for operation of their sUAS in accordance with the operating documents. If current Section 333 exemptions are issued that would allow a lesser pilot certification level, the petitioner requests exemption from the relevant sections of the regulations.

[3] *Foreign civil aircraft* means (a) an aircraft of foreign registry that is not part of the armed forces of a foreign nation, or (b) a U.S.-registered aircraft owned, controlled or operated by persons who are not citizens or permanent residents of the United States. 14 CFR § 375.1.

The FAA must determine the appropriate level of pilot certification for the petitioner's proposed operations. In previous exemptions, the FAA found that a person holding a minimum of a sport or recreational pilot certificate would have the requisite aeronautical knowledge to operate a UAS safely under the terms of those exemptions. Additionally, these certificate holders would also be subject to security screening by the Department of Homeland Security (DHS).

Day Operations:

In Exemption No. 11213 to Aeryon Labs Inc., the FAA compared the aeronautical knowledge requirements of the commercial and private pilot certificates to the recreational and sport pilot certificates to determine how they differed and what would be required for a UAS pilot. The FAA determined that the UAS PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate along with a current FAA airman medical certificate or a valid U.S. driver's license. Therefore, as in Exemption No. 11213, Industrial Skyworks' PICs may hold any of those pilot certificates for day operations conducted under this exemption.

14 CFR §1.1 defines a PIC as the person who has final authority and responsibility for the operation and safety of the flight, has been designated as pilot in command before or during the flight, and holds the appropriate category, class, and type rating, if appropriate for the conduct of the flight. Accordingly, based on Industrial Skyworks' request, the FAA grants relief from §§ 61.101(e)(4) and (5), and 61.113(a), to allow a PIC holding a private pilot certificate to operate a UAS for compensation and hire, subject to the conditions and limitations below.[4] The petitioner also requested relief from § 61.113(b); however relief is not necessary since relief is already granted to § 61.113(a). The FAA is also granting relief from § 61.315(a) as previously determined in Exemption No. 11213, to permit the holder of a sport or recreational pilot certificate to act as the PIC of UAS operated under this exemption.

Additionally, the PIC must hold either a medical certificate issued under 14 CFR part 67 or a U.S. issued driver's license as previously determined in Exemption No. 11213. The PIC must also comply with 14 CFR § 61.53, *Prohibition on operations during medical deficiency*. *See* Exemption No. 11213 for relief granted from *Medical certificates: Requirement and duration* § 61.23(a) and § 61.23(c).

Night Operations:

[4] Similar relief from § 61.315(c)(2) and (3) is not necessary because these limitations on sport pilot certificate privileges only apply to light-sport aircraft (LSA). The UAS being operated under this exemption are not LSA.

Night flying is very different from day flying because human vision at night is not as receptive as it is during the day. Therefore, the FAA has developed processes and procedures to ensure the safety of aircraft operations conducted at night. Pilots operating at night must be trained and tested to ensure they have the basic knowledge required to operate safely at night. The FAA further compared the training and testing requirements of the commercial and private certificates to the recreational and sport pilot certificates to determine how they differed on operations between sunset and sunrise for holders of a recreational pilot certificate or night operations for holders of a sport pilot certificate. The FAA determined that there are additional training and testing requirements at the private pilot level that are not required for holders of a recreational pilot certificate or a sport pilot certificate. For example, training for private pilots includes principles of night vision and night visual illusions, which provides training on human night vision limitations and how to adapt to them and potential confusion and concerns of night illusions. Additionally, private pilots are trained to understand the airplane and airport equipment and lighting, which are necessary for basic operation at night. Holders of a sport pilot certificate do not receive this training and are therefore not permitted to operate aircraft at night.

Though the FAA does not approve UAS training programs such as Industrial Skyworks night training program or its criteria, it does recognize that the training, mitigates the risks of night operations becasue it requires the PIC to accumulate nighttime operating skills, knowledge, and experience of unmanned aircraft prior to conducting commercial operations.

Therefore for night operations, the FAA requires the PIC to hold an airline transport, commercial, or private pilot certificate that allows night operations. The FAA grants relief from 14 CFR § 61.113(a) to allow a PIC holding a private pilot certificate to operate a UAS for compensation and hire subject to the conditions and limitations below. Additionally for night operations, the PIC must hold a medical certificate issued under 14 CFR part 67. The PIC must also comply with 14 CFR § 61.53, *Prohibition on operations during medical deficiency*.

Furthermore, the FAA medical certification process has tests to determine the ability to perceive colors necessary for the safe performance of airman duties. For example, red, green, and white colors are used to indicate the direction and position of flight of manned aircraft. Under this exemption, the PIC operating at night must be able to discern colors to determine the motion of lighted manned aircraft and interpret the relative position of manned aircraft and their direction and motion. This ability to perceive certain colors and have the training to understand the meaning of these colors is necessary for night operations of UAS.
The FAA also considered medical certificate requirements for a visual observer. As in Exemption No. 11213, the FAA determined that this is not necessary subject to the conditions

and limitations below. In particular, the UA must never be operated beyond the actual visual capabilities of the VO, and the VO, any student manipulating the controls, and the PIC must have the ability to maintain VLOS with the UA at all times. It is the responsibility of the PIC to be aware of the VO's visual limitations and limit operations of the UA to distances within the visual capabilities of both the PIC and VO.

UAS Operating Parameters

The petitioner did not request relief from 14 CFR § 91.7(a), *Civil aircraft airworthiness*. While the petitioner's UAS will not require an airworthiness certificate, the FAA has determined that for the purposes of this exemption the pilot may determine the aircraft is in an airworthy condition prior to flight. The FAA's regulations state that the PIC of a civil aircraft is responsible for determining whether the aircraft is in a condition for safe flight. The FAA has determined that relief from § 91.7(a) is necessary and is granted.

Operations Near People

For the reasons discussed below, the FAA finds that Industrial Skyworks may allow a small unmanned aircraft to fly closer than 500 feet to site personnel who are directly participating in the intended purpose of the operation (i.e. conducting building inspections), but may not fly over them. Industrial Skyworks may allow the small unmanned aircraft to fly over people who are required for the safe operation of the UA such as the PIC and the visual observer.

In its petition for exemption, Industrial Skyworks described the following safety mitigations it will exercise during small UAS operations. It proposed that the person operating as PIC would possess at least a private pilot certificate with an airman medical certificate. Further, the petitioner proposes that all operations would take place in a controlled access environment by requiring consent via waiver for all individuals entering the site. Prior to operations a map will be prepared which denotes takeoff and landing points, the area of operations, and the emergency descent zones to be used in the event that operations must be immediately terminated. The petitioner also stated that they will perform a day time site assessment of the operating area and note hazards and obstacles that may be difficult to see in low light conditions. Industrial Skyworks' operational safety measures include the use of pre-programmed flight plans, signage concerning the use of UAS in locations where filming is taking place, a lighted takeoff and landing area for night operations, and a comprehensive security plan. Their safety plan includes; an identified control point from which the PIC will conduct operations, processes to cease operations if unauthorized persons, vehicles, or aircraft enter the area of operation, and visual arm signals and auditory signals to be used during operations to communicate that unauthorized persons have accessed the area.

In Exemption No. 13465A, Kansas State University (KSU) requested to conduct small unmanned aircraft training for compensation. The FAA granted permission for KSU to conduct operations over students manipulating the flight controls and people directly participating in the safe operation of the aircraft such as the PIC and the visual observer. Additionally the FAA granted permission for KSU to operate closer than 500 feet to students who are part of a training class, but not manipulating the flight controls of the small UAS. These students are considered to be directly participating in the intended purpose of the UAS operation. Lastly, the FAA permitted, with the exception of the people directly participating in the safe operation of the small UAS or students who are part of the flight training class, the UAS may only be operated within 500 feet of a person if barriers or structures are present that sufficiently protect that person from the UA and/or debris or hazardous materials such as fuels or chemicals in the event of an accident. The FAA finds that the site personnel participating in the proposed operation are similar to the students of a training class who are not manipulating small UAS flight controls in the case of KSU. The site personnel are similar in that they are not directly participating in the safe operation of the aircraft however they are required for the intended purpose of the UAS operation and are briefed on the risk of UAS operations. Therefore the FAA has determined that the small UAS may be flown within 500 feet of but not over the site personnel.

Based on Industrial Skyworks' safety mitigations[5] and the parameters under which the flight operations will be conducted as noted above, the FAA finds that a small unmanned aircraft that flies closer than 500 feet but not over site personnel in a controlled access area will not adversely affect safety. Additionally, the FAA finds a small unmanned aircraft flying closer than 500 feet to and over people who are directly participating in the safe operation of the UAS, such as the PIC and the visual observer, will not adversely affect safety.

With the exception of the people directly participating in the safe operation of the UAS or the intended purpose of the operation, a UA may only be operated within 500 feet of a person when barriers or structures are present that sufficiently protect that person from the UA and/or debris or hazardous materials such as fuel or chemicals in the event of an accident. Under these conditions, the operator must ensure that these nonparticipating persons remain under such protection for the duration of the operation. 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 that does not cause undue hazard to persons.

[5] The FAA notes the pilot certificate that is required will depend on whether the operation is conducted during the day or at night.

Additionally, operations for training, proficiency, or experience building for PICs to qualify to operate under this exemption must be conducted during dedicated training sessions. Operations for training, proficiency, and experience building may not be conducted within 500 feet of people with the exception of people participating in the safe operation of the UA, to ensure the safety of others.

Therefore, the FAA finds that a small UA may be flown over or near people in accordance with to the conditions and limitations below.

All people associated with the operations must be briefed by the PIC on the potential risk of the proposed flight operation(s) and acknowledge and consent to those risks. The FAA uses briefings as a means to notify passengers and others of safety information and to risks of certain operations. *See, e.g.*, 14 CFR §§ 91.319(d)(1) (advising passengers of experimental nature of an aircraft), 136.7 (air tour briefings). The requirement to obtain consent provides an additional margin of safety by building upon the briefing requirement to ensure that people participating in the intended operation have acknowledged that a UA will be operated within 500 feet.

The FAA recognizes that there are additional risks when operating a UA close to people. As such the FAA has determined that when conducting these types of operations, the operator must have an operations manual addressing the items as specified in the conditions and limitations below. Unmanned aircraft operations conducted in close proximity to people (less than 500 feet) invoke added safety risks. The requirement to operate in accordance with the manual required in the conditions and limitations below, helps ensure that safety will not be adversely affected because the operator must document and address operational safety practices relevant to its operation. An operations manual must include items such as; the operator's contact information, distribution and revision information, persons authorized, plan of activities, permission to operate, security methodology, briefing instructions, flight personnel minimum requirements, communications information, and accident notification plan. Documented operational safety practices and procedures help ensure a safe and repeatable process for conducting flight operations. Formal procedures ensure adequate safety guidelines are available and adhered to in normal operational environments, but also during emergency circumstances. The operations manual is considered part of the operating documents and must be accessible to the PIC during operations. This operations manual is based on the requirement in Exemption No.13465A.

Operators conducting these operations must also submit a written Plan of Activities to the local Flight Standards District Office at least 72 hours prior to initiating operations as described in the conditions and limitations below. The written plan of activities includes

pertinent items provided to Flight Standards District Offices. The written plan of activities is necessary for Aviation Safety Inspectors to conduct surveillance of activities and ensure compliance with the provisions of the authorization and waiver, associated special provisions, operations manual, and the plan of activities in accordance with FAA Order 8900.1 to ensure the safety of the NAS.

Operations Near Vessels, Vehicles, and Structures

Operations near vessels, vehicles, and structures are those operations in which a UA is operated within 500 feet of such objects. To conduct such operations, the PIC must: (1) have permission from a person with legal authority over any vessels, vehicles, or structures located within 500 feet of the UA's operating area; and (2) make a safety assessment of the risk of operating closer to those objects and determine that no undue hazard would result from the operation.

In consideration of the above, the FAA finds that:

a. Relief from § 91.119(a), which requires operating at an altitude that allows a safe emergency landing if a power unit fails, is not granted. The FAA expects the petitioner to be able to perform an emergency landing without undue hazard to persons or property on the surface if a power unit fails.
b. Relief from § 91.119(b), operation over congested areas, is not granted, because this exemption prohibits operations over congested or densely populated areas.
c. Relief from § 91.119(c) is necessary because the aircraft will be operated at altitudes below 500 feet AGL. 14 CFR § 91.119(c) states that no person may operate an aircraft below the following altitudes: *over other than congested areas,* an altitude of 500 feet above the surface, except over open water or sparsely populated areas. The FAA finds operations conducted in compliance with the conditions and limitations in this exemption warrant relief from § 91.119(c).
d. Relief from § 91.119(d) is not necessary. Although this section allows operations below the minimums set forth in the other paragraphs of 91.119 for helicopters, the conditions and limitations below control operations under this exemption.

Per 14 CFR § 91.119, manned aircraft are commonly flown at altitudes of 500 feet above the surface in areas over other than congested areas. In all previous grants of exemption under Section 333, the FAA has limited operating altitudes to less than 400 feet AGL. The FAA finds that UAS operations at altitudes above 400 feet AGL introduce greater risks to manned aviation because of see-and-avoid difficulties when manned and unmanned aircraft operate in shared airspace. As in prior exemptions, the FAA is limiting operations under this exemption to 400 feet AGL as stated in the conditions and limitations below.

The petitioner did not seek relief from 14 CFR § 91.121, *Altimeter settings*. When the UA is equipped with a barometric altimeter, relief from § 91.121 is not necessary. When the UA is not equipped with a barometric altimeter, an alternate means for measuring and reporting UA altitude is necessary, such as GPS. As stated in the conditions and limitations below, the FAA requires altitude be reported in feet AGL. The petitioner may choose to set the altitude indicator to zero feet AGL rather than local barometric pressure or field altitude before flight. Considering the limited altitude of the proposed operations, consistent with previous exemptions, relief from 14 CFR § 91.121 is granted to the extent necessary to comply with the applicable conditions and limitations stated below.

In previous exemptions, the FAA required that the UA be returned to a pre-determined location within the private or controlled area of operation if the UAS loses communication or GPS signal. The FAA has re-examined the situation where the GPS signal is lost or the PIC loses communications with the UA and determined that these two situations employ unique functions and incur different failure modes. Therefore, the FAA has included two separate conditions and limitations addressing each situation. In the situation where the UAS uses GPS navigation and the GPS signal is necessary to safely operate the UA, the PIC is required to immediately recover or land the UA. However, if the UA can be operated safely without a GPS signal, the operation may continue. If the PIC loses command or control link with the UA, the UA must follow a pre-determined route to either reestablish link or immediately land. The modified conditions and limitations preserve the same intent and level of safety, while also adding clarity and reducing restrictiveness for the operator.

The petitioner has requested relief from 14 CFR § 91.151, *Fuel requirements for flight in VFR conditions*, for the electric-powered UAS. Prior UAS specific relief has been granted in Exemption Nos. 8811, 10808, and 10673 for daytime, Visual Flight Rules (VFR) conditions. The FAA has determined that similar reasoning applies to night VFR conditions, because the aircraft is being operated within VLOS in a predetermined area that has been surveyed during the day. The conditions and limitations below prohibit the PIC from beginning a UAS flight unless (considering wind and forecast weather conditions) there is enough available power for UAS to operate for the intended operational time and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater. The FAA finds that this provides sufficient reason to grant the relief from 14 CFR § 91.151 subject to the conditions and limitation below.

The petitioner has proposed to conduct night operations with the Aeryon SkyRanger UAS and has therefore requested relief from 14 CFR § 91.209, *Aircraft lights*. The petitioner states that due to the design of the SkyRanger with a camera on a gimbal, there is no consistent forward

or aft position of the aircraft by which to install red and green position lights. Because of the symmetrical nature of the petitioners UAS quadcopter, the FAA agrees that position lighting would not enhance the safety of the operation. With the other risk mitigations established in this exemption for night operations, the FAA finds sufficient reason to grant relief from 14 CFR § 91.209(a)(1).

Although UAS lighting systems are not designed to any certification standard, the lighting systems must provide adequate illumination for the PIC and VO to maintain VLOS capability and a means for collision mitigation. 14 CFR § 103.11(b) allows ultralight vehicles to be operated during civil twilight, provided the vehicle is equipped with an operating anti-collision light visible for at least three statute miles.

The petitioner stated the Aeryon SkyRanger UAS is equipped with anti-collision lights visible from 5,000 feet. Given that the petitioner has requested to operate within 100 feet of a permanent structure and below 400 feet AGL, this will enable a safe separation between the petitioner's UAS and manned aircraft. A key factor in risk reduction is derived from 14 CFR § 91.119 which generally prohibits aircraft from operating in close proximity to structures and requires aircraft to remain a minimum of 500 feet from any structure. Because manned aircraft are not permitted to operate in close proximity to structures, the FAA believes that the petitioner can safely operate at night as long as the petitioner's UAS remains within 100 feet of the structure up to an altitude of 400 feet AGL in accordance with the conditions and limitations below.

The FAA finds that the petitioner's use of anti-collision lights that are visible from 5,000 feet are adequate for the PIC and VO to maintain VLOS capability and as an additional means for collision mitigation. The FAA finds that a similar requirement for UAS will ensure no adverse impact to the NAS, and will ensure that the UAS is visible during night operations. Therefore, relief from 14 CFR § 91.209(b) for operation of the aircraft without lighted anti-collision lights under this exemption is not granted and the UAS must be equipped with and use lighted anti-collision lighting visible for at least 5,000 feet in accordance with the conditions and limitations below.

The FAA notes that operations at night pose a higher safety risk because the reduced visibility makes it more difficult for the remote pilot to visually locate the UA and, therefore, determine the relative separation with other aircraft in the NAS in order to avoid a collision. The PIC cannot rely on unaided human vision to learn details about the position, attitude, speed, and heading of the small unmanned aircraft. This ability may become impaired at night due to a lack of reference points because all the PIC may see of the small unmanned aircraft is a point of light. Therefore, the petitioner is required to have equipage that would help identify the

precise location, attitude, speed, and heading of the small unmanned aircraft in accordance with the conditions and limitations below.

In further reviewing the safety impact of the petitioner's request to operate a UAS at night, the FAA has considered the proposed aircraft lighting system as discussed above, but also the proposed operation's proximity to a permanent structure. The petitioner proposed to conduct night operations for the purpose of building inspections only (such as roof or wall inspections). As stated in the petitioner's exemption and operating documents, all flight operations will occur within the roof boundaries of the building being inspected or within 100 lateral feet of the wall being inspected. Wall inspections take place from the ground up to the height of the building or 400 feet, whichever is lower. The FAA notes that 14 CFR § 91.119 generally prohibits manned aircraft from operating in close proximity to structures. Section 91.119 requires manned aircraft to stay 500 to 1,000 feet away from the structure, depending on whether the area is congested. Therefore, given the proposed operation is below 400 feet AGL and within 100 feet of a permanent structure, the FAA has determined that these conditions provide an additional level of safety mitigation by ensuring UAS separation from manned aircraft and providing an additional reference point which the operator can use to judge the aircraft's location. The conditions and limitations below provide the operational boundaries and conditions by which the petitioner must comply when conducting night operations.

Additionally, the petitioner stated in its operating documents that the PIC and VO will be in place 30 minutes prior to conducting night operations to ensure dark adaptation. The FAA notes that pilots holding a private pilot certificate or higher are trained to avoid bright lights for 30 minutes to allow their vision to fully adapt to the dark. Therefore, per the conditions and limitations below, the PIC and VO must be in place 30 minutes prior to night operations accordingly.

The petitioner requested relief from 14 CFR §91.113 *Right-of-way rules: Except water operations* since there will be no pilot in the UA to "see and avoid" other aircraft. Section 91.113(b) requires a pilot to maintain vigilance "so as to see and avoid other aircraft." That section requires an aircraft pilot to have the perspective of being inside the aircraft, something that is not possible for the operator of a small UAS at this time. *See* 80 Fed. Reg. 9544, 9549 (Feb. 23, 2015) (Proposed Rule: Operation and Certification of Small [UAS]). The FAA is not granting relief to Section 91.113. However, the FAA is currently addressing the see and avoid requirement through COAs such as those required for operation under this exemption.

The FAA Air Traffic Organization (ATO) reviews all proposed UAS operations and evaluates the safety of these operations relative to the requested airspace through the existing COA

process. The majority of current UAS operations occurring in the NAS are being coordinated through air traffic control (ATC) by the issuance of a COA. This process not only makes local ATC facilities aware of UAS operations, but also provides ATC the ability to consider airspace issues that are unique to UAS operations.

The FAA has issued a COA to this operator, which is attached to this exemption. The COA sets the requirements for alerting other users of the NAS to the UAS activities being conducted. The conditions and limitations below prescribe the requirement for the petitioner to follow the terms of a COA. If the petitioner intends to conduct operations outside of the parameters of what is permitted under the attached COA it may apply to the ATO for a new or amended COA.

In previous exemptions, the FAA limited UAS operations to outside 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 (LOA) with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. In order to maintain operational safety in the vicinity of airports, particularly as it affects Class B, C, or D airspace, instead of contacting the airport management, the petitioner must apply to the ATO for a new or amended COA. The ATO will coordinate an LOA with local air traffic management via the COA process. The FAA finds that this approach facilitates consistency between the exemption and the COA.

In summary, the FAA has determined the following risk mitigations are sufficient to allow this petitioner to operate the Aeryon SkyRanger unmanned aircraft at night

(1) The operational area is within 100 feet of a permanent structure. As a result, manned aircraft will not be operating in the same area and the structure will provide an additional reference point for the PIC to judge the aircraft's location.
(2) The petitioner will conduct a day time site assessment to note hazards and obstacles that may be difficult to see in low light conditions.
(3) The PIC will hold an airline transport, commercial, or private pilot certificate and medical certificate. Training for private pilots includes principles of night vision and night visual illusions, which provides training on human night vision limitations and how to adapt to them and potential confusion and concerns of night illusions. Additionally, private pilots are trained to understand the airplane and airport equipment and lighting necessary for basic operation at night.
(4) The Aeryon SkyRanger UAS is equipped to inform the PIC of the location and altitude of the aircraft so that the PIC does not have to rely on vision alone to estimate these parameters.

(5) The Aeryon SkyRanger will be equipped with anti-collision lighting visible for 5,000 feet. This lighting is sufficient for other aircraft to see the UAS and for the PIC and VO to maintain VLOS within the operational area
(6) The take-off and landing areas are lighted; thereby allowing the PIC to see the distance between the aircraft and ground during takeoff and landing and enabling the observer to monitor that non-participants remain at a safe distance
(7) The petitioner has experience operating the SkyRanger at night in other countries. Though outside the U.S., this experience is still valuable in allowing the petitioner to operate safely under the conditions and limitations of this grant of exemption.
(8) The petitioner requires the PIC to have completed a UAS night operations training program prior to commercial operations. The petitioner's training program helps ensure that the PIC has the knowledge, skills, and abilities to operate an unmanned aircraft at night for commercial purposes.
(9) The PIC and VO are in place 30 minutes prior to night operations to ensure dark adaption.

Public Interest

The FAA finds that a grant of exemption is in the public interest. The enhanced safety and reduced environmental impact achieved using a UA with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying its crew gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

The following table summarizes the FAA's determinations regarding the relief sought by the petitioner:

Relief considered (14 CFR)	**FAA determination (14 CFR)**
21	Relief not necessary
61.23(a) and (c)	Relief granted with conditions and limitations
61.101(e)(4) and (5)	Relief granted with conditions and limitations
61.113(a)	Relief granted with conditions and limitations
61.315(a)	Relief granted with conditions and limitations
91.7(a)	Relief granted with conditions and limitations

Relief considered (14 CFR)	FAA determination (14 CFR)
91.113	Relief not granted
91.119(a) and (b)	Relief not granted
91.119(d)	Relief not necessary
91.119(c)	Relief granted with conditions and limitations
91.121	Relief granted with conditions and limitations
91.151	Relief granted with conditions and limitations
91.203(a)(1)	Relief not necessary
91.209	Relief for 91.209(a) is granted with conditions and limitations; 91.209(b) is not granted
91.405(a) and (b)	Relief granted with conditions and limitations
91.407(a)(1)	Relief granted with conditions and limitations
91.409(a)(1) and (2)	Relief granted with conditions and limitations
91.417(a) and (b)	Relief granted with conditions and limitations

The FAA's Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701, delegated to me by the Administrator, Industrial Skyworks (USA), 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, 91.405(a) and (b), 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 according to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption**,** Industrial Skyworks (USA), 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 Aeryon Scout for day operations and the Aeryon SkyRanger for day or night operations 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. If operations under this exemption involve the use of foreign civil aircraft[6] the operator would need to obtain a Foreign Aircraft Permit pursuant to 14 CFR § 375.41 before conducting any commercial air operations under this authority. Application instructions are specified in 14 CFR §375.43. Applications should be submitted by electronic mail to the DOT Office of International Aviation, Foreign Air Carrier Licensing Division. Additional information can be obtained via https://cms.dot.gov/policy/aviation-policy/licensing/foreign-carriers.

3. 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.

4. 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. This limitation is in addition to any altitude restrictions that may be included in the applicable COA.

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

6. The PIC must have the capability to maintain visual line of sight (VLOS) 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 that individual's FAA-issued airman medical certificate or valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal Government, to see the UA.

7. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the VO at all times. The VO must use human vision

[6] *Foreign civil aircraft* means (a) an aircraft of foreign registry that is not part of the armed forces of a foreign nation, or (b) a U.S.-registered aircraft owned, controlled or operated by persons who are not citizens or permanent residents of the United States. 14 CFR § 375.1.

unaided by any device other than corrective lenses to see the UA. The VO and the 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 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, the applicable ATO-issued COA, and the procedures outlined in the operating documents, the most restrictive conditions, limitations, or procedures apply and must be followed. The operator may update or revise its operating documents as necessary. The operator is responsible for tracking revisions and presenting 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 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 exemption. The FAA's UAS Integration Office 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 other personnel required to conduct the functional flight test (such as a mechanic or technician) and must remain at least 500 feet from all 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 properly 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. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.

13. *PIC certification:* Under this grant of exemption, a PIC must hold either:

    a. *For daytime operations.* 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.
    b. *For night operations.* An airline transport, commercial, or private pilot certificate that allows night operations. The PIC must also hold a current FAA airman medical certificate. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

14. *PIC qualifications:* The PIC must be able demonstrate the ability to safely operate the UAS in a manner consistent with how it will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures before operating non-training, proficiency, or experience-building flights under this exemption. PIC qualification flight hours and currency may be logged in a manner consistent with 14 CFR § 61.51(b), however UAS pilots must not log this time in the same columns or categories as time accrued during manned flight. UAS flight time must not be recorded as part of total time.

    Under all situations, the PIC is responsible for the safety of the operation. The PIC is also responsible for meeting all applicable conditions and limitations as prescribed in this exemption and ATO-issued COA, and operating in accordance with the operating documents. All training operations must be conducted during dedicated training sessions and may or may not be for compensation or hire. The operation must be conducted with a dedicated VO who has no collateral duties and is not the PIC during the flight. The VO must maintain visual sight of the aircraft at all times during flight

operations without distraction in accordance with the conditions and limitations below. Furthermore, the PIC must operate the UA not closer than 500 feet to any nonparticipating person without exception.

15. UAS operations may be conducted during night, as defined in 14 CFR § 1.1, provided:
    a. All flight operations occur within 100 feet of the boundaries of a permanent structure and no higher than 400 feet AGL.
    b. The UAS is equipped with lighted anti-collision lighting visible for at least 5,000 feet.
    c. The UAS is equipped to inform the PIC of accurate position, altitude, attitude, speed, and heading of the aircraft throughout the flight operation.
    d. The petitioner will conduct a day time site assessment to note hazards and obstacles that may be difficult to see in low light conditions.
    e. The PIC and VO are in place 30 minutes prior to night operations to ensure dark adaptation.
    f. The take-off and landing areas are lighted; thereby allowing the PIC to see the distance between the aircraft and ground during takeoff and landing and enabling the observer to monitor that non-participants remain at a safe distance
    g. The PIC is to have operated the UAS listed in the conditions and limitations below at night prior to conducting nighttime commercial operation. The PIC is to have operated the UAS listed in the conditions and limitations below at night prior to conducting nighttime commercial operation.

16. 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.

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

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

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

20. 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.

21. All aircraft operated under with this exemption must be registered in accordance with 14 CFR parts 47 or 48, and have identification markings in accordance with 14 CFR part 45, Subpart C or part 48. For applicability and implementation dates of part 48 see 80 FR 78594 (Dec. 16, 2015).

22. 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.

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

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

25. All flight operations must be conducted at least 500 feet from all persons, vessels, vehicles, and structures unless when operating:
    a. *Over or near people directly participating in the safe operation of the UAS.* People directly participating in the safe operation of the UAS include the PIC, VO, and other consenting personnel that are directly participating in the safe operation of the UA.
    b. *Near but not over people directly participating in the intended purpose of the UAS operation.* People directly participating in the intended purpose of the UAS includes site personnel who must be briefed on the potential risks and acknowledge and consent to those risks. Operators must notify the local Flight Standards District Office (FSDO) with a plan of activities at least 72 hours prior to flight operations.
    c. *Near nonparticipating persons.* Except as provided in subsections (a) and (b) of this section, a UA may only be operated closer than 500 feet to a person when barriers or structures are present that sufficiently protect that person from the UA and/or debris or hazardous materials such as fuel or chemicals in the event of an accident. Under these conditions, the operator must ensure that the person remains under such protection for the duration of the operation. If a situation arises where the person leaves such protection and is within 500 feet of the UA, flight operations must cease immediately in a manner that does not cause undue hazard to persons.

d. *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 determined that it does not present an undue hazard.

26. All operations shall be conducted over private or controlled-access property with permission from a person with legal authority to grant access. Permission will be obtained for each flight to be conducted.

27. 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 within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) in accordance with its UAS accident reporting requirements.

28. The operator must have an operations manual that contains at least the following items, although it is not restricted to these items.
    a. Operator name, address, and telephone number.
    b. Distribution and Revision. Procedures for revising and distributing the operations manual to ensure that it is kept current. Revisions must comply with the applicable conditions and limitations in this exemption.
    c. Persons Authorized. Specify criteria for designating individuals as directly participating in the safe operation of the UAS. The operations manual must include procedures to ensure that all operations are conducted at distances from persons in accordance with the conditions and limitations of the exemption.
    d. Plan of Activities. The operations manual must include procedures for the submission of a written plan of activities.
    e. Permission to Operate. The operations manual shall specify requirements and procedures that the operator will use to obtain permission to operate over property or near vessels, vehicles, and structures in accordance with this exemption.
    f. Security. The manual must specify the method of security that will be used to ensure the safety of nonparticipating persons. This should also include procedures that will be used to stop activities when unauthorized persons, vehicles, or aircraft enter the operations area, or for any other reason, in the interest of safety.
    g. Briefing of persons directly participating in the intended operation. Procedures must be included to brief personnel and participating persons on the risks involved, emergency procedures, and safeguards to be followed during the operation.

h. Personnel directly participating in the safe operation of the UAS Minimum Requirements. In accordance with this exemption, the operator must specify the minimum requirements for all light personnel in the operating manual. The PIC at a minimum will be required to meet the certification standards specified in this exemption.
i. Communications. The operations manual must contain procedures to provide communications capability with participants during the operation. The operator can use oral, visual, or radio communications as along as the participants are apprised of the current status of the operation.
j. Accident Notification. The operations manual must contain procedures for notification and reporting of accidents in accordance with this exemption.

In accordance with this exemption, the operating manual and all other operating documents must be accessible to the PIC during UAS operations.

29. At least 72 hours prior to operations, the operator must submit a written Plan of Activities to the local Flight Standards District Office having jurisdiction over the proposed operating area.

The Plan of Activities must include at least the following:
a. Dates and times for all flights. For seasonal or long-term operations, this can include the beginning and end dates of the timeframe, the approximate frequency (e.g. daily, every weekend, etc.), and what times of the day operations will occur. A new plan of activities must be submitted prior to each season or period of operations.
b. Name and phone number of the on-site person responsible for the operation.
c. Make, model, and serial or N-Number of each UAS to be used.
d. Name and certificate number of each UAS PIC involved in the operations.
e. A statement that the operator has obtained permission from property owners. Upon request, the operator will make available a list of those who gave permission.
f. Signature of exemption holder or representative stating the plan is accurate.
g. A description of the flight activity, including maps or diagrams of the area over which operations will be conducted and the altitudes essential to accomplish the operation.

In accordance with this exemption, the Plan of Activities and all other operating documents must be accessible to the PIC during UAS operations. A new Plan of Activities must be submitted should there be any changes to items (a) through (g).

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 April 30, 2018, unless sooner superseded or rescinded.

Issued in Washington, DC, on April 18, 2016.

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