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May 27, 2014

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

Re: Exemption Request Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations from 14 C.F.R. 45.23(b);14 CFR Part 21;14 CFR 61.113 (a) & (b); 91.7 (a);91.9 (b) (2);91.103(b); 91.109;91.119; 91.121; 91.151(a);91.203(a) & (b);91.405 (a); 91.407(a) (1); 91.409 (a) (2);91.417 (a) & (b).

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the Reform Act) and 14 C.F.R. Part 11, RC Pro Productions Consulting LLC dba Vortex Aerial, developer and operator of Small Unmanned Aircraft Systems ("sUASs") equipped to conduct aerial photography for the motion picture and television industry for scripted closed set filming, hereby applies for an exemption from the listed Federal Aviation Regulations ("FARs") to allow commercial operation of its sUASs, so long as such operations are conducted within and under the conditions outlined herein or as may be established by the FAA as required by Section 333.[1]

As described more fully below, the requested exemption would permit the operation of small, unmanned and relatively inexpensive sUAS under controlled conditions in airspace that is 1) limited 2) predetermined 3) controlled as to access and 4) would provide safety enhancements to the already safe operations in the film and television industry presently using conventional aircraft. Approval of this exemption would thereby enhance safety and fulfill the Secretary of Transportation's (the FAA Administrator's) responsibilities to "…establish requirements for the safe operation of such aircraft systems in the national airspace system." Section 333(c) of the Reform Act.

The name and address of the applicant is:

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[1] The conditions proposed by the applicant are drawn from Order 8900.1 CHG 0, Volume 3, Chapter 8-Issue a Certificate of Waiver for Motion Picture and Television Filming.

Regulations from which the exemption is requested:

14 CFR Part 21
14 C.F.R. 45.23(b)
14 CFR 61.113 (a) & (b)
14 C.F.R. 91.7 (a)
14 CFR 91.9 (b) (2)
14 C.F.R. 91.103
14 C.F.R. 91.109
14 C.F. R. 91.119
14 C.F.R. 91.121
14 CFR 91.151 (a)
14 CFR 91.203 (a) & (b)
14 CFR 91.405 (a)
14 CFR 407 (a) (1)
14 CFR 409 (a) (2)
14 CFR 417 (a) & (b)

This exemption application is expressly submitted to fulfill Congress' goal in passing Section 333(a) through (c) of the Reform Act. This law directs the Secretary of Transportation to consider whether certain unmanned aircraft systems may operate safely in the national airspace system (NAS) before completion of the rulemaking required under Section 332 of the Reform Act. In making this determination, the Secretary is required to determine which types of UASs do not create a hazard to users of the NAS or the public or pose a threat to national security in light of the following:

- The UAS's size, weight, speed, and operational capability;
- Operation of the UAS in close proximity to airports and populated areas; and
- Operation of the UAS within visual line of sight of the operator.

Reform Act § 333 (a). Lastly, if the Secretary determines that such vehicles "may operate safely in the national airspace system, the Secretary shall establish requirements for the safe operation of such aircraft in the national airspace system." *Id.* §333(c) (emphasis added)[2].

The Federal Aviation Act expressly grants the FAA the authority to issue exemptions. This statutory authority by its terms includes exempting civil aircraft, as the term is defined under §40101 of the Act, that includes sUASs, from the requirement that all civil aircraft must have a current airworthiness certificate.

[2] Applicant interprets this provision to place the duty on the Administrator to not only process applications for exemptions under section 333, but for the Administrator to craft conditions for the safe operation of the UAS, if it should be determined that the conditions set forth herein do not fulfill the statutory requirements for approval.

The Administrator may grant an exemption from a requirement of a regulation prescribed under subsection (a) or (b) of this section or any sections 44702-44716 of this title if the Administrator finds the exemption in the public interest. 49 U.S.C. §44701(f) *See also* 49 USC §44711(a); 49 USC §44704; 14 CFR §91.203 (a) (1).

RC Pro Productions Consulting LLC dba Vortex Aerial's sUASs are rotorcraft, weighting 55 or fewer lbs. including payload. They operate, under normal conditions at a speed of no more than 50 knots and have the capability to hover, and move in the vertical and horizontal plane simultaneously. They will operate only in line of sight and will operate only within the sterile area described in the Confidential Motion Picture and Television Operations Manual, attached as Exhibit 1 (hereinafter "the Manual")[3]. Such operations will insure that the sUAS will "not create a hazard to users of the national airspace system or the public."[4]

Given the small size of the sUASs involved and the restricted sterile environment within which they will operate, the applicant falls squarely within that zone of safety (an equivalent level of safety) in which Congress envisioned that the FAA must, by exemption, allow commercial operations of UASs to commence immediately. Also due to the size of the UASs and the restricted areas in which the relevant sUASs will operate, approval of the application presents no national security issue. Given the clear direction in Section 333 of the Reform Act, the authority contained in the Federal Aviation Act, as amended; the strong equivalent level of safety surrounding the proposed operations, and the significant public benefit, including enhanced safety, reduction in environmental impacts, including reduced emissions associated with allowing UASs for movie and television operations, the grant of the requested exemptions is in the public interest. Accordingly, the applicant respectfully requests that the FAA grant the requested exemption without delay.

AIRCRAFT AND EQUIVALENT LEVEL OF SAFETY

The applicant proposes that the exemption requested herein apply to civil aircraft that have the characteristics and that operate with the limitations listed herein. <u>These limitations provide for at least an equivalent or even higher level of safety to operations under the current regulatory structure because the proposed operations represent a safety enhancement to the already safe movie and television filming operations conducted with conventional aircraft</u>.

[3] The Motion Picture Association of America has reviewed this manual and has found it to be acceptable for sUAS filming operations for the television and movie industry. <u>Applicant submits this manual as a Confidential document under 14 CFR 11.35 (b) as the entire manual contains proprietary information that the applicant has not and will not share with others. The manual contains operating conditions and procedures that are not available to the public and are protected from release under the Freedom of Information Act 5 USC 552 et.seq</u>.

[4] Reform Act Section 333 (b).

These limitations and conditions to which RC Pro Productions Consulting LLC dba Vortex Aerial agrees to be bound when conducting commercial operations under an FAA issued exemption include:

1. The sUAS will weigh less than 55 lbs.
2. Flights will be operated within line of sight of a pilot and/or observer.
3. Maximum total flight time for each operational flight will be 30 minutes. Flights will be terminated at 25% battery power reserve should that occur prior to the 30 minute limit.
4. Flights will be operated at an altitude of no more than 400 feet AGL or, not more than 200 feet above an elevated platform from which filming is planned.
5. Minimum crew for each operation will consist of the sUAS Pilot, the Visual Observer, and the Camera Operator.
6. sUAS pilot will be an FAA licensed airman with at least a private pilot's certificate and third class medical. The observer will hold at least a third class medical.
7. sUAS Pilot will be Pilot in Command (PIC). If a pilot certificate holder other than the sUAS Pilot, who possess the necessary PIC qualifications, is also present on set (i.e. the Aerial Coordinator), that person can also be designated as PIC.
8. The UAS will only operate within a confined "Sterile Area" as defined in the Manual. Section H, I and J of the Manual requires the establishment of a "Security Perimeter" for the flight operations area.
9. A briefing will be conducted in regard to the planned sUAS operations prior to each day's production activities. It will be mandatory that all personnel who will be performing duties within the boundaries of the safety perimeter be present for this briefing.
10. The operator will file a FAA Form 7711-1, or its equivalent, as modified in light of the requested exemption, with the appropriate Flight Standards District Office.
11. The operator will obtain the consent of all persons involved in the filming and ensure that only consenting persons will be allowed within 100 feet of the flight operation, and this radius may be reduced to 30 feet based upon an equivalent level of safety determination, as required by Section K of the Manual. With the advanced permission of the relevant FSDO, operations at closer range can be approved.
12. The operator will submit a written Plan of Activities to the FSDO three days before the proposed shoot as required in Section K of the Manual.
13. Pilot and observer will have been trained in operation of UAS generally and received up-to-date information on the particular UAS to be operated as required Sections M and N of the Manual.
14. Observer and pilot will at all times be able to communicate by voice and/or text.
15. Written and/or oral permission from the relevant property holders will be obtained.
16. All required permissions and permits will be obtained from territorial, state, county or city jurisdictions, including local law enforcement, fire, or other appropriate governmental agencies.
17. If the sUAS loses communications or loses its GPS signal, the UAS will have capability to return to a pre-determined location within the Security Perimeter and land.

18. The sUAS will have the capability to abort a flight in case of unpredicted obstacles or emergencies.

14 C.F.R. Part 21, Subpart H: Airworthiness Certificates 14 C.F.R. §91.203 (a) (1)

Subpart H, entitled Airworthiness Certificates, establishes the procedural requirements for the issuance of airworthiness certificates as required by FAR §91.203 (a) (1). Given the size and limited operating area associated with the aircraft to be utilized by the Applicant, an exemption from Part 21 Subpart H meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the Reform Act. The Federal Aviation Act (49 U.S.C.§44701 (f)) and Section 333 of the Reform Act both authorize the FAA to exempt aircraft from the requirement for an airworthiness certificate, upon consideration of the size, weight, speed, operational capability, and proximity to airports and populated areas of the particular UAS. In all cases, an analysis of these criteria demonstrates that the UAS operated without an airworthiness certificate, in the restricted environment and under the conditions proposed will be at least as safe, or safer, than a conventional aircraft (fixed wing or rotorcraft) operating with an airworthiness certificate without the restrictions and conditions proposed.

The sUAS to be operated hereunder is less than 55 lbs. fully loaded, carries neither a pilot nor passenger, carries no explosive materials or flammable liquid fuels, and operates exclusively within a secured area as set out in the Manual. Unlike other civil aircraft, operations under this exemption will be tightly controlled and monitored by both the operator, pursuant to the Manual's requirements, and under the requirements and in compliance with local public safety requirements, to provide security for the area of operation as is now done with conventional filming. The FAA will have advance notice of all operations. These safety enhancements, which already apply to civil aircraft operated in connection with motion picture and television production, provide a greater degree of safety to the public and property owners than conventional operations conducted with airworthiness certificates issued under 14 C.F.R. Part 21, Subpart H. Lastly, application of these same criteria demonstrates that there is no credible threat to national security posed by the UAS, due to its size, speed of operation, location of operation, lack of explosive materials or flammable liquid fuels, and inability to carry a substantial external load.

14 C.F.R. § 45.23 (b). Marking of the Aircraft

The regulation requires:

> When marks include only the Roman capital letter "N" and the registration number is displayed on limited, restricted or light-sport category aircraft or experimental or provisionally certificated aircraft, the operator must also display on that aircraft near each entrance to the cabin, cockpit, or pilot station, in letters not less than 2 inches nor more than 6 inches high, the words "limited," "restricted," "light-sport," "experimental," or "provisional," as applicable.

Even though the UAS will have no airworthiness certificate, an exemption may be needed as the UAS will have no entrance to the cabin, cockpit or pilot station on which the word "Experimental" can be placed. Given the size of the sUAV, two-inch lettering will be impossible. The word "Experimental" will be placed on the fuselage in compliance with §45.29 (f).

The equivalent level of safety will be provided by having the sUAV marked on its fuselage as required by §45.29 (f) where the pilot, observer and others working with the sUAV will see the identification of the UAS as "Experimental." The FAA has issued the following exemptions to this regulation to Exemptions Nos. 10700, 8738, 10167 and 10167A.

14 C.F.R. § 61.113 (a) & (b): Private Pilot Privileges and Limitations: Pilot in Command.

Sections 61.113 (a) & (b) limit private pilots to non-commercial operations**.** Because the UAS will not carry a pilot or passengers, the proposed operations can achieve the equivalent level of safety of current operations by requiring the PIC operating the aircraft to have a private pilot's license rather than a commercial pilot's license to operate this small UAS. Unlike a conventional aircraft that carries the pilot and passengers, the sUAS is remotely controlled with no living thing on board. The area of operation is controlled and restricted, and all flights are planned and coordinated in advance as set forth in the Manual. The level of safety provided by the requirements included in the Manual exceeds that provided by a single individual holding a commercial pilot's certificate operating a conventional aircraft. The risks associated with the operation of the sUAS are so diminished from the level of risk associated with commercial operations contemplated by Part 61 when drafted, that allowing operations of the sUAS as requested with a private pilot as the PIC exceeds the present level of safety achieved by 14 C.F.R. §61.113 (a) & (b).

14 C.F.R. §91.7(a): Civil aircraft airworthiness.

The regulation requires that no person may operate a civil aircraft unless it is in airworthy condition. As there will be no airworthiness certificate issued for the aircraft, should this exemption be granted, no FAA regulatory standard will exist for determining airworthiness. Given the size of the aircraft and the requirements contained in the Manual for maintenance and use of safety check lists prior to each flight, as set forth in Sections J, L and Q, an equivalent level of safety will be provided.

14 C.F.R. § 91.9 (b) (2): Civil Aircraft Flight Manual in the Aircraft.

Section 91.9 (b) (2) provides:

> No person may operate a U.S.-registered civil aircraft …
>
> (2) For which an Airplane or Rotorcraft Flight Manual is not required by §21.5 of this chapter, unless there is available in the aircraft a current approved airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof.

The sUAS, given its size and configuration has no ability or place to carry such a flight manual on the aircraft, not only because there is no pilot on board, but because there is no room or capacity to carry such an item on the aircraft.

The equivalent level of safety will be maintained by keeping the flight manual at the ground control point where the pilot flying the sUAS will have immediate access to it. The FAA has issued the following exemptions to this regulation: Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 9565B, 10167, 10167A, 10602, 32827, and 10700.

14 C.F.R. § 91.103: Preflight action

This regulation requires each pilot in command to take certain actions before flight to insure the safety of flight. As FAA approved rotorcraft flight manuals will not be provided for the aircraft an exemption will be needed. An equivalent level of safety will be provided as set forth in Sections J and K of the Manual. The PIC will take all actions including reviewing weather, flight battery requirements, landing and takeoff distances and aircraft performance data before initiation of flight.

14 C.F.R. §91.109: Flight instruction:

Section 91.103 provides that no person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls.

sUASs and remotely piloted aircraft, by their design do not have fully functional dual controls. Flight control is accomplished through the use of a control box that communicates with the aircraft via radio communications. The FAA has approved exemptions for flight training without fully functional dual controls for a number of aircraft and for flight instruction in experimental aircraft. See Exemption Nos.5778K & 9862A. The equivalent level of safety provided by the fact that neither a pilot nor passengers will be carried in the aircraft and by the size and speed of the aircraft.

14 C.F.R. §91.119: Minimum safe altitudes

Section 91.119 establishes safe altitudes for operation of civil aircraft. Section 91.119 (d) allows helicopters to be operated at less than the minimums prescribed, provided the person operating the helicopter complies with any route or altitudes prescribed for helicopters by the FAA. As this exemption is for a sUAS that is a helicopter and the exemption requests authority to operate at altitudes up to 400 AGL, or not more than 200 above an elevated platform from which filming is planned, an exemption may be needed to allow such operations. As set forth herein, except for the limited conditions stated in the Manual, the UAS will never operate at higher than 400 AGL. It will however be operated in a restricted area with security perimeter, where buildings and people will not be exposed to operations without their pre-obtained consent.

The equivalent level of safety will be achieved given the size, weight, speed of the UAS as well as the location where it is operated. No flight will be taken without the permission of the property owner or local officials. Because of the advance notice to the property owner and participants in the filming activity, all affected individuals will be aware of the planned flight operations as set forth in Section K of the Manual. Compared to flight operations with aircraft or rotorcraft weighting far more than the maximum 55lbs. proposed herein and the lack of flammable fuel, any risk associated with these operations is far less than those presently presented with conventional aircraft operating at or below 500 AGL in the movie industry. In addition, the low-altitude operations of the sUAS will ensure separation between these small-UAS operations and the operations of conventional aircraft that must comply with Section 91.119.

14 C.F.R. §91.121 Altimeter Settings

This regulation requires each person operating an aircraft to maintain cruising altitude by reference to an altimeter that is set "…to the elevation of the departure airport or an appropriate altimeter setting available before departure." As the sUAS may not have a barometric altimeter, but instead a GPS altitude read out, an exemption may be needed. An equivalent level of safety will be achieved by the operator, pursuant to the Manual and Safety Check list, confirming the altitude of the launch site shown on the GPS altitude indicator before flight.

14 C.F.R. § 91.151(a): Fuel Requirements for Flight in VFR Conditions

Section 91.151 (a) prohibits an individual from beginning "a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing, and, assuming normal cruising speed – (1) During the day, to fly after that for at least 30 minutes; or (2) At night, to fly after that for at least 45 minutes."

The battery powering the sUAS provides approximately 40 minutes of powered flight. To meet the 30 minute reserve requirement in 14 CFR §91.151, sUAS flights would be limited to approximately 10 minutes in length. Given the limitations on the UAS's proposed flight area and the location of its proposed operations within a predetermined area, a longer time frame for flight in daylight or night VFR conditions is reasonable.

Applicant believes that an exemption from 14 CFR §91.151(a) falls within the scope of prior exemptions. *See* Exemption 10673 (allowing Lockheed Martin Corporation to operate without compliance with FAR 91.151 (a)). Operating the small UAS, in a tightly controlled area where only people and property owners or official representatives who have signed waivers will be allowed, with less than 30 minutes of reserve fuel, does not engender the type of risks that Section 91.151(a) was intended to alleviate given the size and speed of the small UAS. Additionally, limiting sUAS flights to 10 minutes would greatly reduce the utility for which the exemption will be granted.

Applicant believes that an equivalent level of safety can be achieved by limiting flights to 30 minutes or 25% of battery power whichever happens first. This restriction would be more

than adequate to return the sUAS to its planned landing zone from anywhere in its limited operating area.

Similar exemptions have been granted to other operations, including Exemptions 2689F, 5745, 10673, and 10808.

14 C.F.R. §91.203 (a) and (b): Carrying Civil Aircraft Certification and Registration

The regulation provides in pertinent part:

> (a) Except as provided in § 91.715, no person may operate a civil aircraft unless it has within it the following:
>
> (1) An appropriate and current airworthiness certificate. . . .
>
> (b) No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under §91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

The UAS fully loaded weighs no more than 55 lbs and is operated without an onboard pilot. As such, there is no ability or place to carry certification and registration documents or to display them on the sUAS.

An equivalent level of safety will be achieved by keeping these documents at the ground control point where the pilot flying the sUAS will have immediate access to them, to the extent they are applicable to the sUAS. The FAA has issued numerous exemptions to this regulation. A representative sample of other exceptions includes Exemption Nos. 9565, 9665, 9789, 9789A, 9797, 9797A, 9816A, and 10700.

14 C.F.R. §91.405 (a); 407 (a) (1); 409 (a) (2); 417(a) & (b): Maintenance Inspections

These regulations require that an aircraft operator or owner "shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter...," and others shall inspect or maintain the aircraft in compliance with Part 43.

Given that these section and Part 43 apply only to aircraft with an airworthiness certificate, these sections will not apply to the applicant. Maintenance will be accomplished by the operator pursuant to the flight manual and operating handbook as referenced in the Manual.(See Sections L and Q) An equivalent level of safety will be achieved because these small UASs are very limited in size and will carry a small payload and operate only in restricted areas for limited periods of time. If mechanical issues arise the UAS can land immediately and will be operating from no higher than 400 feet AGL. As provided in the Manual, the operator will ensure that the UAS is in working order prior to initiating flight, perform required maintenance, and keep a log of any maintenance performed. Moreover, the operator is the person most

familiar with the aircraft and best suited to maintain the aircraft in an airworthy condition to provide the equivalent level of safety.

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Pursuant to 14 C.F.R. Part 11, the following summary is provided for publication in the Federal Register, should it be determined that publication is needed:

Applicant seeks an exemption from the following rules:
14 C.F.R. §21, subpart H; 14 C.F.R 45.23(b);14 C.F.R. §§ 61.113(a) & (b);91.7 (a); 91.9 (b) (2);91.103(b);91.109; 91.119; 91.121; 91.151(a);91.203(a) and (b); 91.405 (a); 91.407 (a) (1); 91.409 (a) (2); 91.409 (a) (2) and 91.417 (a) & (b) to operate commercially a small unmanned vehicle (55lbs or less) in motion picture and television operations.

Approval of exemptions allowing commercial operations of sUASs in the film industry will enhance safety by reducing risk. Conventional film operations, using jet or piston power aircraft, operate at extremely low altitudes just feet from the subject being filmed and in extreme proximity to people and structures; and present the risks associated with vehicles that weigh in the neighborhood of 4,000lbs., carrying large amounts of jet A or other fuel (140 gallons for jet helicopters shown below). Such aircraft must fly to and from the film location. In contrast, a sUAS weighing fewer than 55 lbs. and powered by batteries eliminates virtually all of that risk given the reduced mass and lack of combustible fuel carried on board. The sUAS is carried to the film set and not flown. The sUAS will carry no passengers or crew and, therefore, will not expose them to the risks associated with manned aircraft flights.

The operation of small UASs, weighting less than 55 lbs., conducted in the strict conditions outlined above, will provide an equivalent level of safety supporting the grant of the exemptions requested herein, including exempting the applicant from the requirements of Part 21 and allowing commercial operations. These lightweight aircraft operate at slow speeds, close to the ground, and in a sterile environment and, as a result, are far safer than conventional operations conducted with turbine helicopters operating in close proximity to the ground and people.

Privacy

All flights will occur over private or controlled access property with the property owner's prior consent and knowledge. Filming will be of people who have also consented to being filmed or otherwise have agreed to be in the area where filming will take place.

Set forth below are pictures of aerial filming conducted in both day and night environment, as flown today in highly populated and/or urban areas, with turbine powered helicopters. The grant of this exemption request will provide improved safety in both day and night operations.

Night operations will also be conducted by sUASs and as shown in the photographs below, such operations are fully lighted so that visibility is as though filming was conducted during daylight hours.

Satisfaction of the criteria provided in Section 333 of the Reform Act of 2012--size, weight, speed, operating capabilities, proximity to airports and populated areas and operation within visual line of sight and national security – provide more than adequate justification for the grant of the requested exemptions allowing commercial operation of applicant's UAS in the motion picture and television industry pursuant to the Manual appended hereto.

Sincerely,

Jonathan B. Hill
Cooley LLC
Counsel for RC Pro Productions Consulting LLC dba Vortex Aerial.

John McGraw
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cc: James Williams
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