

October 7, 2014

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

RE: Exemption Request Under Section 333 of the FAA Modernization and Reform Act of 2012 and 14 C.F.R. Part 11

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 ("FAA Reform Act") and 14 C.F.R. Part 11, Unmanned Systems, Inc. ("USI") request exemptions from two provisions of the Federal Aviation Regulations ("FAR"), specifically portions of 14 C.F.R. Part § 45 and Part § 91 to allow commercial operations of its fleet of rotary aircraft. The fleet includes a Multirotor G4 7.8 Skycrane unmanned aerial system ("Skycrane"), a modified F-450 quadcopter by Flame Wheel, and a Tarrot 900 hexacopter (all of these are referred to as "rotorcraft" from here on) The operation of these aircraft will be used in the continental United States ("CONUS") by individuals who, at a minimum, maintain an FAA private pilot certification or FAA-recognized equivalents, and completed the manufacture's training plan for Skycrane and the USI training plan for the others.

USI seeks an exemption for use of small unmanned aerial system ("sUAS") to support film and television production in a tightly controlled and limited airspace. USI will utilize its currently established standards for operations that have been approved by the FAA when it was issued its experimental certification for Sandstorm and apply that to all other operations. USI will continue with the recommended factory maintenance plan and the maintenance plan of the authorized service contractor, Robotic Sky for Skycrane. As described in detail below, the requested exemption would permit the operation of the sUAS under controlled conditions that meet the requirements set in this document as well as Order 8900.1 CHG 0, Volume 3, Chapter 8-Issue a Certificate of Waiver for Motion Picture and Television Filming (referred to as "the Manual" from here on).

Granting USI's request comports with the Secretary of Transportation's ("FAA Administrator's") responsibilities to not only integrate UASs into the national airspace system, but to " ... establish requirements for the safe operation of such unmanned aircraft systems [UASs] in the national airspace system" under Section 333(c) of the Reform Act. Further, USI will conduct its operations in compliance with the protocols described herein or as otherwise established by the FAA. USI respectfully requests the grant of an exemption allowing it to operate the fleet of sUAS.

The Skycrane is a rotary wing sUAS weighing 15lbs and is 1'8" tall with a 3'7" diameter. It can fly up to 31 miles per hour and has a range of 0.6 miles with a maximum altitude of 1000 feet. The flight time of the system is up to 15 minutes with a maximum payload of 8.27lbs. The Skycrane has a GPS system that enables it to return to its launch position even when it has lost link with the controller. The Skycrane also has the ability to station-keep and conduct a landing at its current location if there are no control inputs and a loss of GPS.

The F-450 is a quadcopter sUAS that weighs under 10lbs and has been modified with longer arms and retractable landing gear. The F-450 is equipped with a GPS system to allow for

directs the Secretary of Transportation to consider whether certain UASs may operate safely in the NAS before completion of the rulemaking required under Section 332 of the FAA Reform Act. To make that determination, the Secretary must evaluate 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 several criteria:

- 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.

FAA Reform Act § 333(b)(1). Once 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).

The Federal Aviation Act expressly grants the FAA the authority to issue exemptions. 49 U.S.C. § 44701(f). This statutory authority, by its terms, includes exempting civil aircraft, as the term is defined under §40101 of the Act, from the requirements that all civil aircraft must have a current airworthiness certificate, 49 U.S.C. § 44711(a), and those used in commercial service must be piloted by private and/or commercial pilots. 14 C.F.R. §§ 61.113(a) and (b), 61.133.

The grant of the requested exemption is in the public interest based on (i) the clear direction in Section 333 of the FAA Reform Act; (ii) additional authority in the Federal Aviation Act, as amended; (iii) the strong equivalent level of safety surrounding the proposed operations; and (iv) the significant public benefit, including enhanced safety and cost savings associated with utilizing UASs for agriculture, aerial survey photography, and patrolling. Accordingly, USI respectfully requests that the FAA grant the requested exemption without delay.

Airworthiness and Operations

USI proposes that the grant of the exemption be subject to the following mandatory conditions, which are based upon operating conditions set forth for operation of UAS by public entities pursuant to Certificates of Waiver or Authorization, with additional restrictions:

1. The Small UAS (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 45 minutes. Flights will be terminated at 25% battery power reserve should that occur prior to the 45 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 second class medical. The observer will hold at least a third class medical.
7. sUAS Pilot will be Pilot in Command (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 an 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 it will have the capability to return to a pre-determined location within the Security Perimeter and land. If the sUAS loses signal from the GPS and from the pilot it will land at its current location once 25% battery life is reached.
 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

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 in compliance with local public safety requirements to provide security for the area of operation. 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 sUAS, 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 sUAS marked on its fuselage as required by §45.29 (f) where the pilot, observer, and others working with the sUAS 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. To provide for the differences in knowledge level the chief pilot for USI is a commercially rated pilot that will oversee all planned flight operations and will approve all operating areas and operating plans. 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 with the above oversight and plans will achieve a level of safety commiserate with the current rules set forth 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 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 ensure 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 is 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. Specifically, Section 91.119(c) limits aircraft flying over areas other than congested areas to an altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

As set forth herein, the rotorcraft will never operate at higher than 400 feet AGL. Because film and television applications must be accomplished at relatively low altitudes, *i.e.*, less than 500 feet AGL, an exemption from Section 91.119(c) is required.

The equivalent level of safety will be achieved given the size, weight, speed, and material with which the rotorcraft is built. Additionally, no flight will commence without the permission of the land owner or the party controlling the operating area. With advance notice to the landowner, all affected individuals will be aware of film or television production flights. Compared to similar operations conducted with conventional aircraft or rotorcraft, which weigh thousands of pounds and carry flammable fuel, any risk associated with these operations will be significantly reduced from those currently allowed for conventional aircraft operating at or below 500 feet AGL. Waivers have been granted to other UAS operators for such operations in Alaska. USI believes such operations can be conducted within the CONUS airspace for the same reasons justifying operations under the existing waiver in Alaska.

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." 14 C.F.R. § 91.151(a).

The rotorcraft batteries provide between 10 and 45 minutes of powered flight. Without an exemption from 14 C.F.R. § 91.151, the rotorcraft flights would not be possible. Given the limitations on its proposed operations and the location of those proposed operations, a longer duration for flight in daylight VFR conditions is reasonable.

USI believes that an exemption from 14 C.F.R. § 91.151(a) is safe and consistent with the scope of a prior exemption. See Exemption 10673 (allowing Lockheed Martin Corporation to operate without compliance with 91.151(a)). Operating the rotorcraft, a small UAS, without 30 minutes of reserve fuel does not engender the type of risks that Section 91.151(a) was meant to prevent. The fact that the rotorcraft carries neither a pilot, passenger, nor cargo enhances the reduced risk to overall safety. In the unlikely event that the rotorcraft should run out of battery, it would land per its autopilot instructions before the batteries are completely depleted. Given its weight and construction material, the risks are significantly less than contemplated by the current regulation.

USI believes that an equivalent level of safety can be achieved by maintaining 25% battery life as being the equivalent of minimum fuel, this would be more than adequate to return the UAS to its planned landing zone from anywhere in its planned operating area.

Similar exemptions have been granted to others, 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 55lbs and is operated without an onboard pilot. As such, there is no ability 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 sections 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 as it 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.

Federal Register Summary

Pursuant to 14 C.F.R. § 11.81(f), the following summary is provided for publication in the Federal Register, should the FAA determine that publication is needed:

Docket No: FAA-2014-_____
Petitioner: Unmanned Systems Inc.

14 C.F.R. §21, subpart H; 14 C.F.R 45.23(b); 14 C.F.R. § 61.113 (a) and (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 in close 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 helicopter) Such aircraft must fly to and from the film location. In contrast, a battery powered sUAS weighing fewer than 55 lbs. 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 sUASs, 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.

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 with is VLOS and national security. Provided in the above documentation is 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,

Donald G. Bintz
President
Unmanned Systems Inc.