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October 15, 2014

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

Re: Exemption Request per Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations from the following:
14 CFR 61.113 (a) & (b);
91.103(b);
91.119;
91.121;
91.151(a);
91.405 (a);
91.407(a) (1);
91.409 (a) (2); and
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, Advanced Aerial Inspection Resources, LLC, (AAIR) hereby applies for an exemption from the listed Federal Aviation Regulations ("FARs") to allow business use (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

I. INTRODUCTION

AAIR intends to operate Small Unmanned Aircraft Systems ("sUASs") equipped to conduct aerial photography or other multi-spectral imaging for the purpose of structural and/or conditional assessment of high voltage electrical transmission monopoles and towers, tall communication monopoles and towers, and large wind turbine monopole towers and blades,

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;

¹ For consistency and ease of FAA review, AAIR's request generally tracks, in format and content, the initial requests for exemption filed by various film industry sUAS operators. AAIR gratefully acknowledges their work in this regard.

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2) predetermined; and 3) largely inaccessible by other aircraft or the general public. The proposed operations would provide significant safety enhancements to the methods currently being used to provide those structural and/or conditional assessments.

In addition to the clearly recognizable safety benefits, the general public would realize economic benefit through an increase in structural reliability of critical infrastructure found throughout the United States. Approval of this exemption by the FAA will provide a safer alternative for inspection and assessment of the infrastructure, and will provide public benefit to the citizens of the United States who depend upon reliable electrical power (generation, transmission, and distribution), and wireless and data communications.

Approval of this exemption would further 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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Specific Regulations from which the exemption is requested:²

14 CFR 61.113 (a) & (b)
14 C.F.R. 91.103
14 C.F. R. 91.119
14 C.F.R. 91.121
14 CFR 91.151 (a)
14 CFR 91.405 (a)
14 CFR 407 (a) (1)
14 CFR 409 (a) (2)
14 CFR 417 (a) & (b)

It is obvious that Congress' goal in passing Section 333(a) through (c) of the Reform Act was to provide, in that legislation, a mechanism for such exemption requests. Through these Section 333 exemption provisions, Congress has directed the Secretary of Transportation to fairly consider whether

² AAIR intends to comply with 14 C.F.R. 91.9(b) and 14 CFR 91.203(a) and (b) in accordance with the FAA Chief Counsel's August 8, 2014 Memorandum, "Interpretation regarding whether certain required documents may be kept at an unmanned aircraft's control station."

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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 significant 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).

Moreover, 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).

II. AAIR'S PROPOSED OPERATIONS DO NOT CREATE A SIGNIFICANT HAZARD

The sUAS's utilized by AAIR are electric multi-rotor craft, weighing less than 5 lbs. including payload. They operate, under normal conditions at a speed of no more than 20 knots and have the capability to hover, and/or move in a vertical and horizontal plane simultaneously. They will only be operated as visual line of sight (VLOS), will remain under 400 ft. in elevation above ground, and will operate only with permission of the owners of the facilities being inspected (Electrical Utilities, Telecommunication Facilities Owners, or Wind Farm Operators).

Additionally, the proposed operations involve aerial inspection of unoccupied structures, generally built upon right of ways with adequate buffer to protect the public from physical harm or invasion of privacy during inspection operations. For example, most utility structures are in the middle of a right of way that is between 150-200 ft wide. AAIR's operations would remain within that right of way. Virtually all wind turbine towers are also generally remote and on a "wind farm" that is owned by the wind farm. AAIR's operations would remain vertically within the wind farm's footprint. Moreover, wind turbine towers and wind farms are already subject to obstruction marking, lighting and notification requirements set forth by the FAA. Similarly, telecommunications towers are generally some distance from dwellings, and even those that are not are generally sited within a right of way, and AAIR's operations would remain within that right of way.

Such operations will insure that the sUAS will “not create a hazard to users of the national airspace system or the public.”³

Given the small size of the sUASs (less than 5 lbs. including payload) involved and the restricted environment within which they will operate, this application falls squarely within that zone of safety (an equivalent level of safety) in which Congress envisioned that the FAA must, by exemption, allow for 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.

AAIR has drafted, and submits confidentially, a Flight Operations Manual which discusses safety considerations, training and general operating procedures for the proposed operations. AAIR has also drafted, and submits confidentially, an sUAS Manual which sets for the specifications, inspection and setup of the sUAS intended for use in the proposed operations.

III. AAIR’S PROPOSED OPERATIONS ARE IN THE PUBLIC INTEREST

By the clear language of Section 333, AAIR’s proposed operations are in the public interest because they advance Congress’s explicit goal of getting commercial sUAS flying in the United States safely and soon. AAIR’s operations are exactly the “dull, dirty [and] dangerous” operations which the FAA has recognized as perfectly suited for UAS operations. *See, e.g.*, statement of Jim Williams, Manager, FAA UAS Integration Office, contained transcript of “FAA UAS Online Listening Session, April 3, 2013,” (“[I]nspecting high-tension wire electrical towers all over the United States [is] high-risk operations, which are well suited for a UAS.”).

Current alternatives utilized for these inspections and/or assessments include: ground based inspections (limited in effectiveness); access with high reach man lifts (limited in elevations that can be reached); physical climbing of the poles/towers; and inspections or assessments conducted from conventional aircraft (primarily helicopters). Photos of these types of operations are appended hereto. All are dangerous compared to the safer use of a sUAS as proposed by AAIR.

A 2009 “Safety Guide for Helicopter Operations” published by the Utilities, Patrol and Construction Committee of Helicopter Association International stated that “between 1979 and May 2007 there were 25 helicopter accidents with 43 fatalities conducting utility work in the US. Generally . . . a collision with wires while conducting these operations will result in fatalities and/or serious injuries to the crews and total loss of the aircraft.”⁴

³ Reform Act Section 333 (b).

⁴ See, “UPAC Safety Guide for Helicopter Operators,” found online at <http://www.rotor.com/AboutHAI/Committees/UtilitiesPatrolandConstruction.aspx>.

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The AFL-CIO reviewed OSHA statistics regarding aerial lift accidents between 1992 and 1999 and concluded that an average of 26 construction workers die each year from using aerial lifts, with the majority of deaths resulting from electrocutions and falls.⁵

A 2011 newspaper article regarding wind and solar-powered installations noted 78 wind-turbine related fatalities since the 1970s.⁶ Similarly, an investigation of the telecommunications tower industry found that, between 2003 and 2010, the average fatality rate for the tower industry was more than 10 times greater than the construction industry, with 13 worker deaths in 2013 alone.⁷

AAIR strongly believes that allowing it to conduct these type of operations using an sUAS would substantially reduce the injuries and fatalities which have resulted from existing methods of inspection. AAIR believes that this reduction in injuries and fatalities demonstrates both that the operations substantially exceed the equivalent level of safety found in the FARs, and that granting this exemption is in the public interest. 49 USC 44701(f). *See also* 49 USC §44711(a); 49 USC §44704; 14 CFR §91.203 (a) (1).

Accordingly, AAIR respectfully requests that the FAA grant the requested exemption without delay.

IV. EQUIVALENT LEVEL OF SAFETY

AAIR proposes that the exemption requested herein apply to civil aircraft that have the characteristics and operate with the limitations listed herein. These limitations, as listed below, provide for at least an equivalent or even higher level of safety to operations under the current regulatory structure.

These limitations and conditions to which Advanced Aerial Inspection Resources agrees to be bound when conducting commercial operations under an FAA issued exemption include:

1. The sUAS utilized by AAIR will weigh less than 5 lbs.
2. Flights will be operated within visual line of sight (VLOS) of a pilot in constant control of the craft.
3. Maximum total flight time for each operational flight will be approximately 25 minutes. Flights will be terminated at 25% battery power reserve should that occur prior to the 25 minute limit.

⁵ See, "Deaths from Aerial Lifts," found online at http://www.elcosh.org/document/1417/d000484/Deaths%2BFrom%2BAerial%2BLifts.html?show_text=1.

⁶ "More Accidents Feared as Wind, Solar-Powered Installations Spread," 8.14.11 Los Angeles Times article, found online at <http://www.toledoblade.com/Energy/2011/08/14/More-accidents-feared-as-wind-solar-power-installations-spread.html>.

⁷ "Cell Tower Worker Fatalities Continue: More than a Dozen Deaths since 2012," 1.16.14 article found online at <http://scienceblogs.com/thepumphandle/2014/01/16/cell-tower-worker-fatalities-continue-more-than-a-dozen-deaths-since-2012/>.

4. Flights will be operated at an altitude of no more than 400 feet AGL.
5. Flights will not occur within 5 miles of an active commercial airport.
6. Flights will only occur during daylight hours and in good weather conditions (good visibility, no rain).
7. Minimum crew for each operation will consist of the sUAS Pilot, and the Camera Operator.
8. The sUAS Pilot will have all authority and autonomy over flight decision.
9. The sUAS Pilot will have a minimum of 100 hours flight training in the operation of the specific sUAS being operated, including "ground school" to insure understanding and meaning of different "air spaces" as defined by FAA.
10. A safety briefing will be conducted in regard to the planned sUAS operations prior to each day's inspection activities.
11. A detailed inspection plan will be prepared and briefed at the beginning of each inspection operation.
12. Written and/or oral permission from the relevant property holders will be obtained.
13. If the sUAS loses communications or loses its GPS signal, the UAS will have capability to return to a pre-determined location and autonomously land itself.

V. EXEMPTIONS REQUESTED

14 C.F.R. § 61.113(a) and (b): Private vs. Commercial Pilot Certificates

Sections 61.113(a) and (b) prohibit private pilots from operating an aircraft for compensation or hire. For the reasons set forth in the FAA's grant of an exemption to Astraeus Aerial, AAIR does not believe a commercial pilot certificate is necessary for the operations it intends to conduct. For those reasons, AAIR requests an exemption from 14 C.F.R. § 61.113(a) and (b).

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 as previously described. The sUAS Pilot will take all actions including reviewing weather, flight battery requirements, landing and takeoff clearance distances and aircraft performance data before initiation of flight.

14 C.F.R. §91.119(c): Minimum Safe Altitudes

Section 91.119 establishes safe altitudes for operation of civil aircraft. Section 91.119

(c) prohibits operations below 500 feet above the surface, or closer than 500 feet to any person, vessel, vehicle or structure. As this exemption is for an sUAS that flies similarly to a helicopter and the exemption requests authority to operate at altitudes up to 400 AGL, an exemption may be needed to allow such operations.

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, where required. Because of the advance notice to the property owner and participants, all affected individuals will be aware of the planned flight operations as set forth in inspection plan. AAIR therefore requests a waiver from Section 91.119(c) for all participating persons, i.e., persons associated with the operations.

AAIR will also ensure that non-participating persons are kept at least 500 feet from the operating area, or seek approval from the Administrator for less separation if an equivalent level of safety can be achieved.

Compared to flight operations with aircraft or rotorcraft weighting far more than the maximum 5lbs. proposed herein and the lack of flammable fuel, any risk associated with these operations is far less than those risks associated with the conventional methods of inspection. In addition, the low-altitude operations of the sUAS will ensure separation between these small- UAS operations and the operations of any 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.

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 25 minutes of powered flight. To meet the 30 minute reserve requirement in 14 CFR §91.151, sUAS flights would not be able to fly. AAIR 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 with less than 30 minutes of flight time, 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.

AAIR believes that an equivalent level of safety can be achieved by limiting flights to less than 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. §91.405 (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 AAIR. Maintenance will be accomplished by the operator pursuant to AAIR’s Operations Manual.

An equivalent level of safety will be achieved because these small UASs are very limited in size (less than 5 lbs.) 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 AAIR’s Operations 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.

VI. REGULATIONS FOR WHICH EXEMPTIONS ARE UNNECESSARY

The Federal Aviation Administration just issued a number of exemptions for UAS operations in filming of movies. In those exemptions, the agency noted that exemptions from certain regulations were not necessary, due to “the size, weight, speed and limited operating area associated with [the UASs] and its operation.”

Based upon the FAA’s guidance, and the fact that AAIR’s UAS is even smaller and slower than those proposed by the film-making industry, AAIR believes exemptions from the following regulations are not necessary:

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14 C.F.R. § 45.23 (b). Marking of the Aircraft
 14 C.F.R. §91.7(a): Civil aircraft airworthiness.
 14 C.F.R. §91.109: Flight instruction.

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:

AAIR seeks an exemption from the following rules:

14 C.F.R. § 61.113(a) and (b); 91.7 (a); 91.103(b); 91.119; 91.121; 91.151(a); 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 (5lbs or less) for the purpose of conducting structural and conditional assessments on high voltage electrical transmission monopoles and towers, tall communication monopoles and towers, and large wind turbine monopole towers and blades. Approval of exemptions allowing commercial operations of sUASs for these applications will enhance safety by reducing risk. Conventional means for performing these assessments require either physically climbing the poles or towers, using ropes to rappel down the tower from the top of the tower, using high-reach man lifts to access the towers (limited reach), or using conventional helicopters operating at extremely low altitudes over the subject structure being photographed. These conventional means all pose risks to persons and property.

In contrast, a sUAS weighing fewer than 5 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 project site 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, ground-based aerial lift (bucket truck) operations, or manual climbing and inspection operations.

The operation of small UASs, weighing less than 5 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 AAIR from the requirements of Part 21 and allowing commercial operations. These lightweight aircraft operate at slow speeds, close to the ground, and in a low population environment and, as a result, are far safer than conventional alternatives.

Privacy

All flights will occur over private or controlled access property with the property owner's prior consent and knowledge.

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

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exemptions allowing commercial operation of AAIR's sUAS in the inspection of electrical, telecommunication and wind energy facilities industry pursuant to the Manual appended hereto.

Sincerely,



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Counsel for AAIR



John McGraw
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Consultant to AAIR

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