U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

April 1, 2015

Exemption No. 11277
Regulatory Docket No. FAA−2014−0873

Mr. Courtney R. Bateman
Counsel for Advanced Aerial Inspection Resources, LLC
Reed Smith, LLP
1301 K Street, NW., Suite 1100
Washington, DC 20005

Dear Mr. Bateman:

This letter is to inform you that we have granted your request for exemption. It transmits our decision, explains its basis, and gives you the conditions and limitations of the exemption, including the date it ends.

**The Basis for Our Decision**

By letter dated October 15, 2014[1], you petitioned the Federal Aviation Administration (FAA) on behalf of Advanced Aerial Inspection Resources, LLC (hereinafter petitioner or operator) for an exemption. The exemption would allow the petitioner to operate an unmanned aircraft system (UAS) to conduct aerial photography or other multi-spectral imaging for the purpose of structural and conditional assessment of high voltage electrical transmission monopoles and towers, tall communication monopoles and towers, and large wind turbine monopole towers and blades.

See Appendix A for the petition submitted to the FAA describing the proposed operations and the regulations that the petitioner seeks an exemption.

[1] By letter dated February 12, 2015, the petitioner responded to the FAA's request for information.

**Discussion of Public Comments:**

A summary of the petition was published in the Federal Register on November 13, 2014, (79 FR 67534). Three comments were received. The Small UAV Coalition (Coalition) supported the petition. The Air Line Pilots Association, International (ALPA) and the National Agricultural Aviation Association (NAAA) opposed it.

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 Public Law 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. 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[2] 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 operating altitude and the restricted access to sUAS operating sites. 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[3] allows

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[2] 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; …"

[3] 49 USC § 44701(f)

the FAA to 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 determinations for operations under section 333 is operation within visual line of sight. The PIC must maintain VLOS while operating the UA. 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.

ALPA expressed concern regarding several aspects of the petition. ALPA noted that operations will take place in airspace that is limited, predetermined areas with controlled access but the petitioner does not detail procedures for controlling the airspace or area of operation. Specifically, ALPA stated "there must be means both to ensure that the sUAS remains within the defined airspace and to ensure that the hazard of other aircraft intruding on the operation is mitigated."

The FAA believes the limitations under which the petitioner will operate (i.e. VLOS and at or below 400 feet above ground level (AGL)) are sufficient mitigations to this risk so that the operations will not adversely affect safety.

ALPA stated the petition does not clearly state how the pilot and required observer will be able to communicate. When using voice or radio communications, ALPA claimed the pilot and observer should be able to maintain a visual observation of the aircraft and area of operation. NAAA stated UAS observers must be present and able to communicate with the operator from the most minimal distance possible. The conditions and limitations regarding PIC and visual observer communications address those concerns.

ALPA asserted the UAS's lithium polymer batteries have numerous associated fire and explosion hazards as outlined in DOT/FAA/AR−09/55, "Flammability Assessment of Lithium-Ion and Lithium-Ion Polymer Battery Cell Designed for Aircraft Power Usage (January 2010)," and that the safe carriage of the batteries and the mitigations in place for known risks should be addressed. The referenced study was primarily conducted to determine how certain battery cells react in a fire situation aboard manned airplanes. Given the size of the battery and the operating conditions of the UAS, the FAA concludes that the use of a lithium polymer battery will not pose an undue safety risk for the proposed operations.

ALPA commented that command and control (C2) link failures are one of the most common failures on a UAS, and that lost link mitigations should require safe modes to prevent

fly-aways or other scenarios. The FAA has inserted conditions and limitation in this exemption to mitigate the risk associated with such failures.

ALPA also noted that the petitioner's proposed operations are for "compensation or hire," and therefore contends the pilot must hold at least a current FAA commercial pilot certificate with an appropriate category and class rating for the type of aircraft being flown, as well as specific and adequate training on the UAS make and model intended to be used. Similarly, ALPA asserted a current second-class airman medical certificate should be required. NAAA also commented on pilot qualification, stating—

> Just as manned aircraft pilots are required to undergo a rigorous training curriculum and show that they are fit to operate a commercial aircraft, so too must UAS operators. Holding a commercial certificate holds UAS operators to similar high standards as commercial aircraft operators and ensures they are aware of their responsibilities as commercial operators within the NAS. Medical requirements ensure they have the necessary visual and mental acuity to operate a commercial aircraft repeatedly over a sustained period of time.

The FAA has reviewed the knowledge and training requirements of sport, recreational, private and commercial certificates and concluded that a PIC with a minimum of a sport pilot certificate, operating under this exemption, would not adversely affect operations in the NAS or present a hazard to persons or property on the ground.

ALPA opposed an exemption from the pre-flight action requirements of § 91.103. In addition, although the petitioner did not request an exemption from § 91.113, ALPA noted the petitioner must specify a means to meet see and avoid requirements in § 91.113 given the absence of an onboard pilot. The FAA notes that all flights must be operated within VLOS of the PIC and VO.

Regarding the minimum safe altitude requirements of § 91.119, ALPA stated all aircraft in the NAS must operate to the same high level of safety. ALPA argued this includes the maintenance of a safe altitude for both airplanes and helicopters.

ALPA commented the aircraft will not have a barometric altimeter as required by 14 CFR § 91.121. ALPA stated that processes or mitigations must be in place to ensure the UA can accurately maintain altitude including engineering processes, software development and control, electronic hardware development and control, configuration management, and design assurance to ensure the aircraft and its control system(s) operate to the same level of safety as other aircraft operated commercially in the National Airspace System (NAS).

Regarding the fuel requirements of § 91.151, ALPA argued that using batteries as the only source of an aircraft's power is a substantial shift from traditional methods of propulsion, and requires further research to determine best safety practices.

Regarding §§ 91.405(a), 91.407(a)(1), 91.409(a)(2), and 91.417(a) and (b), ALPA opposed the petitioner's attempt to avoid compliance with established aircraft maintenance and recordkeeping requirements. ALPA states the UAS should comply with the same level of safety as other aircraft operated commercially in the NAS. The FAA finds that adherence to the petitioner's operating documents, as required by the conditions and limitations below, is sufficient to ensure that safety is not adversely affected.

ALPA also expressed concern that the petitioner's request is not for a single specific operation or location, but for all operations of the same general type. ALPA stated that this results in a considerable increase in the FAA's oversight tasks. The FAA notes ALPAs concern and in order to minimize potential impact to the NAS, the FAA requires that each operator secure a Certificate of Authorization or COA which covers specific details of the petitioners operation. The FAA recognizes that UAS integration will generate new NAS access demand and will review and adjust accordingly.

NAAA noted that its members operate in low level airspace, and therefore clear low level airspace is vital to the safety of these operators. NAAA stated that seeing and avoiding other aircraft and hazardous obstructions is the backbone for agricultural safety, and that agricultural pilots depend on pilots of other aircraft to perform their see and avoid functions to prevent collisions. NAAA believes UAS operations at low altitudes will increase the potential for collision with agricultural aircraft.

The FAA recognizes these concerns and has incorporated associated conditions and limitations into this exemption, including: ( a) a Notice to Airmen (NOTAM) issued for all operations;, (b) operations conducted within VLOS of the pilot in command (PIC) and the VO,; and (c) the UAS PIC must always yield right-of-way to manned aircraft.

NAAA stated that FAA airworthiness certification should be a requirement for all unmanned aircraft to operate within the NAS. NAAA recommended UAS be equipped with ADS-B or similar identification and positioning systems, strobe lights, high-visibility markings and registration numbers. NAAA also recommended UAS be operated strictly within the line-of-sight of the ground controller, with the assistance of a VO and well clear of any low-flying manned aircraft.

As discussed below, Section 333 of the FAA Modernization and Reform Act of 2012 authorizes the Secretary of Transportation to determine, considering a number of factors laid out in the statute, that an airworthiness certificate is not necessary for certain operations. The Secretary has made that determination in this case and therefore the aircraft operated by the petitioner will not need to be certificated by the FAA.

**Airworthiness Certification**

The UAS proposed by the petitioner is an ASCTEC Falcon 8.

In accordance with the statutory criteria provided in Section 333 of Public Law 112−95 in reference to 49 U.S.C. § 44704, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that relief from 14 CFR part 21, C*ertification procedures for products and parts, Subpart H—Airworthiness Certificates,* and any associated noise certification and testing requirements of part 36, is not necessary.

**The Basis for Our Decision**

You have requested to use a UAS for aerial data collection. The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grants of Exemption Nos. 11062 to Astraeus Aerial (*see* Docket No. FAA−2014−0352), 11109 to Clayco, Inc. (*see* Docket No. FAA−2014−0507), 11112 to VDOS Global, LLC (*see* Docket No. FAA−2014−0382), and 11213 to Aeryon Labs, Inc. (*see* Docket No. FAA−2014−0642), the FAA found that the enhanced safety achieved using an unmanned aircraft (UA) with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

Having reviewed your reasons for requesting an exemption, I find that—

- They are similar in all material respects to relief previously requested in Grant of Exemption Nos. 11062, 11109, 11112, and 11213;
- The reasons stated by the FAA for granting Exemption Nos. 11062, 11109, 11112, and 11213 also apply to the situation you present; and
- A grant of exemption is in the public interest.

**Our 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, Advanced Aerial Inspection Resources, LLC 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(a)(1), 91.405(a), 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 a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

**Conditions and Limitations**

In this grant of exemption, Advanced Aerial Inspection Resources, LLC 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 ASCTEC Falcon 8 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. Operations for the purpose of closed-set motion picture and television filming are not permitted.

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.

5. The UA must be operated within visual line of sight (VLOS) of the PIC 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 the PIC's FAA-issued airman medical certificate or U.S. driver's license.

6. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and 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.

7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of 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 and the procedures outlined in the operating documents, the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operating documents. The operator may update or revise its operating documents. It is the operator's responsibility to track such revisions and present 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 grant of 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 grant of exemption. The FAA's UAS Integration Office (AFS-80) may be contacted if questions arise regarding updates or revisions to the operating documents.

8. 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 must remain at least 500 feet from 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.

9. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.

10. 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.

11. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the aircraft and aircraft components.

12. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.

13. Under this grant of exemption, a PIC must hold either 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 Colombia, 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.

14. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. PIC qualification flight hours and currency must be logged in a manner consistent with 14 CFR § 61.51(b). Flights for the purposes of training the operator's PICs and VOs

(training, proficiency, and experience-building) and determining the PIC's ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption are permitted under the terms of this exemption. However, training operations may only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights, all persons not essential for flight operations are considered nonparticipants, and the PIC must operate the UA with appropriate distance from nonparticipants in accordance with 14 CFR § 91.119.

15. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.

16. The UA may not operate within 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 with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.

17. 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.

18. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the private or controlled-access property.

19. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.

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

22. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification (N-Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.

23. 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.

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

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

26. All Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:
    a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. 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 ensuring the safety of nonparticipating persons; and
    b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

    The PIC, VO, operator trainees or essential persons are not considered nonparticipating persons under this exemption.

27. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.

28. 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 (AFS-80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

If this permits operations for the purpose of exemption closed-set motion picture and television filming and production, the following additional conditions and limitations apply.

29. The operator must have a motion picture and television operations manual (MPTOM) as documented in this grant of exemption.

30. At least 3 days before aerial filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local Flight Standards District Office (FSDO) with jurisdiction over the area of proposed filming. The 3-day notification may be waived with the concurrence of the FSDO. The plan of activities must include at least the following:
    a. Dates and times for all flights;
    b. Name and phone number of the operator for the UAS aerial filming conducted under this grant of exemption;
    c. Name and phone number of the person responsible for the on-scene operation of the UAS;
    d. Make, model, and serial or N-Number of UAS to be used;
    e. Name and certificate number of UAS PICs involved in the aerial filming;
    f. A statement that the operator has obtained permission from property owners and/or local officials to conduct the filming production event; the list of those who gave permission must be made available to the inspector upon request;
    g. Signature of exemption holder or representative; and
    h. A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which filming will be conducted and the altitudes essential to accomplish the operation.

31. Flight operations may be conducted closer than 500 feet from participating persons consenting to be involved and necessary for the filming production, as specified in the exemption holder's MPTOM.

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, 2017, unless sooner superseded or rescinded.

Sincerely,

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

ReedSmith

Courtney R. Bateman
Direct Phone: +1 202 414 9265
Email: CBateman@reedsmith.com

Reed Smith LLP
1301 K Street, N.W.
Suite 1100 - East Tower
Washington, D.C. 20005-3373
Tel +1 202 414 9200
Fax +1 202 414 9299
reedsmith.com

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.

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:

Advanced Aerial Inspection Resources, LLC
Attn: Wesley J. Oliphant, PE, F.SEI, F.ASCE
Ph: 281-259-7000
Email: woliphant@polesafety.com
Address: 32628 Decker Prairie Rd. Suite 1
Magnolia, TX 77355

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."

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 hight-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]

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[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.

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.

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[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:

14 C.F.R. Part 21, Subpart H: Airworthiness Certificates

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

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,

Courtney R. Bateman
Reed Smith LLP
Counsel for AAIR

John McGraw
John McGraw Aerospace Consulting
Consultant to AAIR

CRB:lsj