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

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

June 16, 2015

Exemption No. 11837
Regulatory Docket No. FAA–2015–1157

Dr. Sarah R. Collins, Ph.D.
President
Avant Unmanned Aerial Solutions, LLC
2645 Twin Point Drive
Suite 101−A
Lewisville, TX 75056

Dear Dr. Collins:

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.

By letter dated April 15, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Avant Unmanned Aerial Solutions, LLC (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct remote sensing, aerial surveys, data and imagery collection for various industries and functions.

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

The FAA has determined that good cause exists for not publishing a summary of the petition in the Federal Register because the requested exemption would not set a precedent, and any delay in acting on this petition would be detrimental to the petitioner.

Airworthiness Certification

The UAS proposed by the petitioner are the DJI Phantom 2 Vision Plus, DJI Inspire, DJI Phantom 3, andEvent 38 E384.

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, *Certification 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[1]. 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, Avant Unmanned Aerial Solutions, 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.

[1] Aerial data collection includes any remote sensing and measuring by an instrument(s) aboard the UA. Examples include imagery (photography, video, infrared, etc.), electronic measurement (precision surveying, RF analysis, etc.), chemical measurement (particulate measurement, etc.), or any other gathering of data by instruments aboard the UA.

Conditions and Limitations

In this grant of exemption, Avant Unmanned Aerial Solutions, 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 DJI Phantom 2 Vision Plus, DJI Inspire, DJI Phantom 3, and Event 38 E384 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 Columbia, Puerto Rico, a territory, a possession, or the Federal government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

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 exemption permits operations for the purpose of 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 June 30, 2017, unless sooner superseded or rescinded.

Sincerely,

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

Enclosures

April 15, 2015

Department of Transportation
Docket Management System
1200 New Jersey Avenue SE
Washington, DC 20590

SUBJECT: Petition for Exemption to Operate Small Unmanned Aircraft Pursuant to Section 333

Petition Summary

Pursuant to Section 333 of the Federal Aviation Administration (FAA) Modernization and Reform Act of 2012 (FMRA), Avant Unmanned Aerial Solutions, LLC (Avant) hereby petitions for expedited approval and exemption from FAA authorizing commercial operation of its small unmanned aircraft systems (sUAS) for remote sensing, aerial surveys, data and imagery collection for the industries and functions listed in Table 1.

Table 1: Industries served and functions performed	
Agriculture	Insurance
Construction	Law Enforcement
Emergency Response	Planning & Asset Management
Engineering & Surveying	Promotion & Marketing
Environmental Monitoring	Real Estate & Land Development
Event Photography & Videography	Training & Education
Inspections	Transportation & Infrastructure

If granted, the exemption would permit Avant to conduct commercial operations of small unmanned aircraft systems (sUAS) that meet or exceed operational and safety requirements set forth by Congress in Section 333. As an unmanned aircraft technology firm, Avant requests operations granted under like conditions and limitations set forth in previous, and similar, Section 333 summary exemptions granted by FAA.

Statutory Authority

Section 333 (a) states that the FAA "shall determine if certain unmanned aircraft systems (UAS) may operate safety in the national airspace system before completion of the plan and rulemaking required by Section 332". Section 333 (b) then lists several factors that should be considered in

determining which UAS' would be eligible for expedited integration into the National Airspace System (NAS). Specifically UAS' that "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 the users of the national airspace system or the public, or pose a threat to national security." If a UAS meets the criteria laid forth in Section 333 (b), Section 333 (c) FAA has the authority to decide if an airworthiness certification as specified by Title 49 United States Code, Section 44704 is required for operation. Section 333 (c) specifically states that the FAA can determine "whether a certificate of waiver, certificate of authorization, or airworthiness certification under section 44704 of Title 49, United States Code, is required for the operation of unmanned aircraft systems." Thus, the FAA has the ability to allow a UAS that meets the criteria put forth in Section 333 (b) to operate within the NAS without an airworthiness certification as long as the UAS does not pose any hazard or threat to the NAS, public, and national security.

Request for Relief

In meeting the aforementioned requirements, Avant requests relief and exemption from the regulations summarized in Table 2.

Table 2: Relief and exemptions summary	
14 CFR 61.113(a) and (b)	14 CFR 91.109
14 C.F.R. 91.7 (a) and (b)	14 CFR 91.119
14 CFR 91.9 (b) (2)	14 CFR 91.121
14 CFR 91.103	14 CFR 91.151(a)
14 C.F.R. 91.401-91.417	

Unmanned Aircraft Systems

Avant is requesting an exemption to operate a DJI Phantom 2 Vision Plus, DJI Inspire, DJI Phantom 3, and Event 38 E384.

Avant's sUAS proposed for operation through this request weigh less than 55 pounds, fly at speeds of no more than 100 miles per hour (MPH), carry neither a pilot nor passenger, carry no explosive materials or flammable liquid fuels, and will operate within approved flight areas and heights through coordination and communication with the Flight Standards District Office (FSDO), Air Traffic Organization (ATO), air traffic control facilities and personnel, and any other entities or persons to satisfy terms set forth by the FAA for this exemption request.

DJI Phantoms and Inspire

The Phantoms and Inspire sUAS are four-rotor, lithium polymer battery powered unmanned aircraft manufactured by DJI. DJI is a global leader in the sUAS market with thousands of their products in use for professional and recreational purposes.

Given their extensive use and reliability, Avant asserts both the Inspire and Phantom series platforms can operate safely in the National Airspace System (NAS) through their appropriate use and operations in accordance with Avant's training and operating parameters.

These vertical takeoff and land (VTOL) quad-copters have GPS, autonomous flight capabilities, with telemetry and manual ground control. These aircraft are equipped with gimbals and high definition cameras. Each of these platforms have the capability to limit flight height above ground level (AGL) and limit flights in controlled airspace.

The Phantom's dimensions are 8.1 x 17 x 12.5 inches. The Inspire is 22 in x 22 in x 8 in. Both weight under 10 pounds. The following is representative of failsafe emergency procedures available between the Phantom and Inspire.

- Loss of Communication: If the communication link with the PIC/operators ground control station is lost, the platform will initiative a return to home mode after three seconds of transmission loss.
- Low Battery: Initiated automatically based on remaining battery life, altitude, and distance from home point - when the battery level is too a warnings is alerted to the PIC/operator and the aircraft can automatically begin a return to home procedure.
- Loss of GPS: Losing a GPS signal while flying autonomously will trigger the aircraft to hover using onboard altitude sensing. The PIC can then land the aircraft as soon as possible.

Event 38 E384

The E384 sUAS is manufactured by Event 38. This lightweight fixed-wing platform is powered by a lithium polymer battery operated by a ground control station, and associated data link equipment. The E384 is made of a foam airframe, weighs less than 10 pounds, has approximately a 6 foot wingspan, and is 4.5 feet in length. The cruising operational speed of is approximately 27 mph (23.5 knots). This small, lightweight unmanned aircraft operating at relatively slow speeds will pose little to no threat or hazard to people or structures on the ground, thus making it an exponentially safer alternative to manned, fixed-wing aircraft operating for similar applications.

The E384 functions primarily to provide aerial imagery and remote sensing capabilities using one of a selection of interchangeable cameras. High resolution imagery enable data collection, extraction, and analysis from imagery produced by these cameras with application to numerous industries such as surveying, architecture, engineering, agriculture, insurance, planning, and transportation just to name few. Information gleaned from the imagery will help in countless ways like maximizing crop yields, improving response times and coordination following natural disasters, expediting insurance

adjustment claims, and enhanced decision making and overall efficiencies amongst several industries ranging from real estate, planning, asset management, and more by having access to higher quality data. Practically speaking, all of these provide great benefit to the economy and the overall public.

The E384 is a hand launched platform that requires no runway for take-off and landing. Once launched, the E384 will operate at an altitude of 400 ft. AGL or less over a designated and authorized flight area.

Prior to each flight, the Pilot in Command (PIC) will set dimensions of a designated flight area and relevant flight parameters to ensure the E384 operates within the lateral, not to exceed visual line-of-sight (VLOS), and vertical, not to exceed 400 feet AGL, geographic limits of an approved site for operation. In the event a critical issue is detected e.g. a low battery state or loss of datalink, the E384 will immediately initiate a return-to-launch/home sequence.

The E384 has extensive flight experience and a history of operational success overseas, including flights by over one hundred professional operators on 6 continents. The items below overview examples of its successful use provided from the manufacturer.

1. Used to survey potential land for hydroelectric power plant construction in Uganda.
2. The National Technical University of Athens in Greece used it for studying open-pit mining.
3. The Belize Fishery Department began routine flights with the E384 to track illegal fishing in protected waters.
4. Recently the E384 was flown over three days at the Cleveland Airshow in the United States – a demonstration of its ability to safely integrate and operate in the NAS.

Each of the sUAS platforms described above are equipped with advanced sensors and high definition cameras. They also have built-in capabilities to limit flight altitude above ground level (AGL) and the radius distance flown from the pilot/operator. Safety parameters to prevent, if needed, operations in controlled airspace through a no fly zone feature is also possible with the DJI platforms.

In addition, each of the Avant's sUAS have integrated safety features designed to help ensure the safety of persons and property within and surrounding an active operation area. For instance, as described above, if one of the aircraft lose communication with its ground control station or geographic positioning system (GPS) signal the aircraft can autonomously return to a pre-determined location or hover in place until the manually landed safely, respectively.

The Petitioner has supplied the following additional Information as appendices for consideration of this request:

- DJI Phantom Series Operation, Maintenance Materials (Appendix A)
- DJI Inspire Operation, Maintenance Materials (Appendix B)

- Event38 E384 Operation, Maintenance, and Training Materials (Appendix C)

Aircraft Marking

Each of Avant's sUAS will be identified by serial number, registered in accordance with 14 C.F.R. Part 47, and have an identification (N-Number) markings displayed as large as practicable in accordance with 14 C.F.R. Part 45.

Pre-flight Inspection, Maintenance

Before each flight an Avant PIC will perform a series of pre-flight and takeoff checks as defined by the manufacturer noted in the Appendices provided.

Routine inspection of all aircraft components, including, but not limited to the items listed below will take place:

- Motors, wiring and connectors
- Propellers, smooth, no chips
- Batteries, wiring and connectors
- Remote command and control
- Ground control station

UAS Operating Parameters

Avant PICs and visual observers, present during any and all flights, will ensure all operation remain within VLOS. Flights will be limited to 400 feet AGL – which is accurately measured by GPS. Avant's sUAS operators and PICs are well equipped and trained for operations sought in this exemption with two being commercially rated pilots – one having an airline transport pilot certificate.

Communication and coordination with the appropriate FSDO will take place prior to operations, as needed. Further coordination will take place, as required, with the Air Traffic Organization to obtain a Certificate of Authorization (COA) prior to any operations granted in this requested exemption. Avant sUAS will 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.

Avant's sUAS operations will remain clear and yield to the right of way of all manned aircraft operations and activities (including, but not limited to, ultralight vehicles, parachute activities, parasailing activities, and hangliders).

Additionally, a grant of the exemption to Avant to operate their sUAS will be subject to the following operating conditions. These are based in part on the operating conditions set forth by the Academy of Model Aeronautics.

- Operations to be conducted over private, controlled-access, or public property where approved;
- Permission from the land owner/authority required before commencing any flight;
- Operations over congested areas shall be avoided to the extent possible;
- Operations must not interfere with manned aircraft operations, must yield the right of way to manned aircraft, and operators must See & Avoid other aircraft and obstacles at all times;
- Operations limited to Visual Flight Rules Meteorological Conditions (VMC) and daylight hours
- Aircraft operations must remain within Visual Line of Sight (VLOS) and will be visually monitored by the PIC and/or Visual Observer at all times;
- All operations conducted within 5 miles from an airport shall only be initiated after verbal coordination with the airport authority, or air traffic control when a control tower is present at the airport;

Pilot in Command (PIC)

Any Avant PIC/operator under this grant of exemption will hold, at a minimum, a 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 will also meet flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

Regarding Avant's requested relief from 14 C.F.R. § 91.103(b)(1), the unmanned aircraft PIC/operator will comply with applicable procedures and requirements stated in § 91.103(a) and (b). Specifically, Avant PIC/operators will initiate all necessary actions including review of weather conditions, flight time and battery requirements, aircraft performance data, and landing and takeoff distances before each flight. Any site-specific conditions will also be planned and considered during preflight procedures and considerations.

Radio Frequencies

Radio frequencies used will be those allotted by the Federal Communications Commission (FCC) for data transmission and vehicle control in unlicensed frequency bands. All devices used will comply with FCC usage and emissions regulations.

Safety and Benefits of the UAS

Avant plans to operate their sUAS in a variety of applications that generally would require flying expensive, full-size manned aircraft to successfully conduct a mission or project.

Small, light, unmanned aircraft vehicles and their systems offer countless benefits over the use of full-sized manned aircraft to numerous industries (see Exhibit 2) leveraging products from aerial surveys,

remote sensing, data and imagery collection. Replacing significantly larger manned aircraft carrying flights crews and flammable fuel with sUAS that do not carry people creates a much greater margin of safety for UAS operators and visual observers by contrast to a manned aircrafts flight crew and passengers. The lower acquisition, operational, and personnel costs, in addition to reduced environmental impacts such as reduced noise and emissions, through the use of batteries for power – in lieu of fuel and combustion engines, are reasons why it is beneficial to the public for Avant to receive FAA authorization to operate its unmanned aircraft.

Conclusion

For the foregoing reasons, and public benefit, the exemption requested herein should be granted and Avant permitted to conduct small UAS operations in accordance with its manuals and all other operating parameters deemed necessary and appropriate by the FAA.

Respectfully,

Sarah R. Collins, Ph.D.
President
Avant Unmanned Aerial Solutions, LLC

Specific Exemption Requests and Equivalent Level of Safety Showings

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

(a) No person may operate a civil aircraft unless it is in an airworthy condition.

(b) The pilot in command of a civil aircraft is responsible for determining whether that aircraft is in condition for safe flight. The pilot in command shall discontinue the flight when unairworthy mechanical, electrical, or structural conditions occur.

Sections 91.7 (a) and (b) prohibit operation of a civil aircraft unless it is in airworthy condition. Avant requests an exemption from this regulation because their sUAS would not operate with an airworthiness certificate under the proposal set forth in this filing. Given the size of the aircraft and requirements contained in the manuals for maintenance and use of safety check lists prior to each flight, as set forth in in the operators manual, an equivalent level of safety will be provided.

The FAA has issued similar exemptions to this regulation, including to Tradecraft LLC, Exemption No. 11303.

14 CFR 61.113 Private pilot privileges and limitations: Pilot in Command and 61.133

Commercial pilot privileges and limitations.

The regulation provides that no person that holds a Private Pilot certificate may act as pilot in Command of an aircraft for compensation or hire. Subparagraph (b) allows a private pilot to act as pilot in command of an aircraft in connection with any business or employment if: (1) The flight is only incidental to that business or employment; and (2) The aircraft does not carry passengers or property for compensation or hire.

Avant's proposed operations require that the unmanned aircraft PIC must hold at least a Sport Pilot Certificate issued by the FAA. Since the aircraft cannot carry passengers or property, it is believed Avant meets the intent of 61.113 Subparagraph (b) even though the intent of this application is to conduct operations for compensation or hire.

14 C.F.R. § 91.109(a): Flight Instruction

Section 91.109 (a) 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.

Avant's sUAS are remotely piloted aircraft, and, by design, do not have fully functional dual controls. Flight control is accomplished through the use of a remote control and transmitters that communicates with the aircraft via radio communications. Completing instruction through the Avant training program will ensure an equivalent level of safety. 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 and 9862A.

14 C.F.R § 91.119 Minimum Safe Altitudes

Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

(c) Over other than congested areas. 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 by Avant, their sUAS will never operate at an altitude higher than 400 feet AGL. Due to the nature of work proposed for remote sensing, aerial surveys, data and imagery collection this work necessitates flights at relatively low altitudes, i.e. less than 500 feet AGL, and an exemption from Section 91.119(c) is needed. The equivalent level of safety will be achieved given the size, weight speed, and material with which Avant's sUAS are built. Additional consideration will be given prior to flights such as communication and permission with the land owner or the party controlling the land. With advance notice, all affected individuals will be aware of Avant's remote sensing, aerial surveys, data and imagery collection. 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 far less than those currently allowed with such conventional aircraft operating at or below 500 feet AGL. The FAA has approved exemptions for minimum safe altitudes to Chustz Surveying – Exemption No. 11285.

14 C.F.R § 91.121 – Altimeter Settings

91.121 requires aircraft to maintain a cruising level or flight level in reference to a current reported altimeter setting. Avant's sUAS are not equipped with a programmable altimeter but rather determine location and altitude via an onboard GPS. Additionally, since the E384 will be operating at or below 400 ft. AGL, there is no need to maintain hemispherical cruising altitudes for de-confliction with manned aircraft. For these reasons Avant seeks exemption from this regulation.

An equal level of safety will be achieved through the Phantom, Inspire and E384 GPS, which provides altitude and location data to the PIC via the ground control station. The sUAS Operations Manual, provided as Appendices, specifically addresses monitoring altitude and GPS readings prior to commencing flight operations. Combined with the fact that the aircraft's altitude will be visually monitored by the PIC and Visual Observer, an equal level of safety is attained in lieu of referencing an altimeter setting.

The FAA has approved exemptions for minimum safe altitudes to Pravia – Exemption No. 11166.

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

Section 91.151 (b) prohibits an individual from beginning "a flight in a rotorcraft 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, to fly after that for at least 20 minutes.

The Phantom and Inspire series battery life provides at most 25 minutes of powered flight. Without an exemption from 14 C.F.R. §91.151, flights would be limited to 5 minutes or less.

Given the limitations on Avant's proposed operations, a lesser reserve for flight in VFR conditions is reasonable. Avant 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 Phantom and Inspire sUAS without 20 minutes of reserve fuel does not produce the type of risks Section 91.151 (a) intended to prevent. Given its weight and construction material, the risks are less then contemplated by the current regulation. Avant believes that an equivalent level of safety can be achieved by the fact that their sUAS can safely utilize VTOL capability to quickly and safely land within 3 minutes of an area within VLOS once alerted of a low battery.

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

Part 91 Subpart E (91.401-91.417) – Maintenance, Preventative Maintenance, and Alterations

These regulations provided the maintenance and inspections requirements in reference to Part 39 and Part 43. 91.405 (a) specifically states that "no person may perform maintenance, preventive maintenance, and alterations on an aircraft other than as prescribed in this subpart and other applicable regulations, including part 43 of this chapter." Avant seeks full exemption from these regulations due to the fact that these sections apply to an aircraft with an airworthiness certificate for which Avant is already seeking exemption.

An equal level of safety will be achieved by using the Phantom, Inspire, and E384 Operations and Maintenance Manuals (see appendices provided with this exemption request) which provide instructions on regular and corrective maintenance. Avant's will be responsible for conducting and logging maintenance in accordance with these procedures. Avant PICs test to confirm their sUAS are suited for flight following any maintenance. Maintenance that Avant is not capable of performing, or covered in these procedures, will be performed by the manufacturers.

Similar exemptions have been granted to others such as TradeCraft, Exemption 11303, Toledo Aerial Media, Exemption 11288, and Skyphilly, Exemption 11256.

Appendix A - DJI Phantom Series Operation, Maintenance Materials

- Phantom 2 Vision+ User Manual (EN) v1.8: http://download.dji-innovations.com/downloads/phantom_2_vision_plus/en/Phantom_2_Vision_Plus_User_Manual_v1.8_en.pdf.
- Phantom 2 Vision+ Pilot Training Guide (EN) v1.1: http://download.dji-innovations.com/downloads/phantom_2_vision_plus/en/Phantom_2_Vision_Plus_Pilot_Training_Guide_v1.1_en.pdf.
- Smart Flight Battery Safety Guidelines (EN, FR, DE and JP): http://download.dji-innovations.com/downloads/phantom_2_vision_plus/Smart_Flight_Battery_Safety_Guidelines.pdf.

Appendix B - DJI Inspire Operation, Maintenance Materials

- Inspire 1 User Manual (EN) v1.0: http://download.dji-innovations.com/downloads/inspire_1/en/Inspire_1_User_Manual_v1.0_en.pdf.
- Inspire 1 Safety Guidelines v1.0: http://download.dji-innovations.com/downloads/inspire_1/en/Inspire_1_Safety_Guidelines_en.pdf.
- Intelligent Flight Battery Safety Guidelines v1.0: http://download.dji-innovations.com/downloads/inspire_1/en/Intelligent_Flight_Battery_Safety_Guidelines_en.pdf.
- Inspire 1 Maintenance Manual v1.0: http://download.dji-innovations.com/downloads/inspire_1/en/Inspire_1_Maintenance_ManualV1.0_en.pdf.

Note: Due to many materials linked above exceeding the maximum allowable upload file size on FAA's exemption portal, this information is being provided in the form of direct links on the manufacturers website. Please contact Avant if this information needs to be supplied by another means.