



U.S. Department
of Transportation

**Federal Aviation
Administration**

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

June 30, 2015

Exemption No. 11948
Regulatory Docket No. FAA–2015–1349

Mr. Theodore W. Tierney
d/b/a Airfoil Enterprises, Inc.
165 West Islip Road
West Islip, NY 11795

Dear Mr. Tierney:

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 17, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Airfoil Enterprises, Inc. (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct land surveying and mapping services in New York and Hawaii.

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 is a DJI Inspire 1.

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*. 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 the requested 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 collection¹. 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 Astraesus 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, Airfoil Enterprises, Inc. 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, Airfoil Enterprises, Inc. 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 Inspire 1 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.nts.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 July 31, 2017, unless sooner superseded or rescinded.

Sincerely,

John S. Duncan
Director, Flight Standards Service

Enclosures

U.S. Department of Transportation
Docket Management System
1200 New Jersey Ave., SE
Washington, DC 20590
Filed with www.regulations.gov

DEPARTMENT OF
TRANSPORTATION
APR 17 2015
7:15 PM '15

Re: Petition for Exemption Under Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations

Dear Madam, Sir,

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the "Reform Act"), P.L. 112-95, "Special Rules for Certain Unmanned Aircraft Systems" and 14 C.F.R. Part 11, Theodore W. Tierney, d.b.a. Airfoil Enterprises Inc. ("AFI") providing land surveying services in New York and Hawaii, seeks an exemption from the Federal Aviation Regulations ("FARs") and listed below:

14 C.F.R. Part 21
14 C.F.R. 45.23
14 C.F.R. 45.29
14 C.F.R. 61.23
14 C.F.R. 61.3
14 C.F.R. 61.113(a) & (b)
14 C.F.R. 61.133(a)
14 C.F.R. 91.7(a)
14 C.F.R. 91.9
14 C.F.R. 91.109(a)
14 C.F.R. 91.119
14 C.F.R. 91.121
14 C.F.R. 91.151(a)
14 C.F.R. 91.203
14 CFR Subpart E (91.401 - 91.417)

Summarized for purposes of Federal Register publication:

Applicant seeks an exemption from the following rules:

. 14 C.F.R. Part 21, 14 C.F.R. 45.23, 14 C.F.R. 45.29, 14 C.F.R. 61.23, 14 C.F.R. 61.3, 14 C.F.R. 61.113(a) & (b), 14 C.F.R. 61.133(a), 14 C.F.R. 91.7(a), 14 C.F.R. 91.9, 14 C.F.R. 91.109(a), 14 C.F.R. 91.119, 14 C.F.R. 91.121, 14 C.F.R. 91.151(a), 14 C.F.R. 91.203, 14 CFR Subpart E (91.401- 91.417)

to operate commercially a small unmanned vehicle (55lbs or less) augmenting its land surveying operations.

Contact information for the Applicant is :

-Airfoil Enterprises Inc. mailing address: 165 West Islip Rd. West Islip, NY 11795

-Theodore W. Tierney residential address: 46 Bayside Place Amityville, NY 11701

Phone: 516-241-5489

Email: tripilot50@gmail.com

FAA private pilot certificate #3036030

New York State driver license #961104163

The requested exemption would authorize Airfoil Enterprises Inc.(AFT) to perform commercial operations that would enhance its existing Surveying and Mapping services, including but not limited to imaging for Precision Agriculture applications, Digital Terrain Modeling, Infrastructure reconnaissance and inventory with GIS applications for Private, Local, State and Federal entities.

These services will be augmented by use of either or all of the following:

The Inspire 1, quad electric motor UAS manufactured by DJI Inc.

The requested exemption would authorize commercial operations using the UAS for land survey applications. These operations will be subject to strict operating and conditions defined by the UAS manufacturer's standards and procedures in order to ensure at least an equivalent level of safety to currently authorized operations using manned aircrafts.

Upon receipt of the exemption contemplated herein, AFI shall, if required, obtain a Certificate of Waiver or Authorization (COA) form the FAA Air Traffic Organization prior to conducting operation(s) in the NAS.

Further, the professional services to be augmented by the uses contemplated herein are, by law, performed under the supervision of a Registered Land Surveyor whom, by virtue of his or her experience and licensing, technical knowledge of GPS, plane geometry, trigonometry and spherical geometry along with a full understanding of the rights of all owners of property both above and below its limits, inherently and uniquely make AFI a particularly well suited entity for the safe and efficient commercial use of UAS. In fact, certain aspects of the contemplated services using UAS are regulated by State Law and Regulation promulgating the licensing of land surveyors and land assessors.

By this petition, AFI seeks an exemption that will authorize it to use the DJI Inspire for commercial purposes provided its operators comply with any terms and conditions of the FAA's anticipated grant of exemption, including the procedures and requirements set forth in the respective manufacturer's user manuals. AFI requests the FAA treat the DJI Inspire user manual as proprietary under 14 C.F.R. 11.35(b) and not include such documents in the public docket. These manuals are, by reference, incorporated herein and are part of existing Petitions for Exemption under Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations, identified as follows:

- **Docket ID:**FAA-2015-0133
- **Petition of:** **DJI Inc.**, for an exemption from portions of 14 C.F.R. Part 21;
- **Document Type:** Other
- **Document Subtype:** Petition(s)
- **Status:** Posted
- **Received Date:** January 30, 2015

Under the requested exemption, AFI as operator of the DJI Inspire will ensure that the aircraft will be operated by an individual who has completed the UAS manufacturer's training program for operation of the UAS.

1. CHARACTERISTICS OF THE AIRCRAFT

The DJI Inspire is a small and ultra-light platform that perform precision aerial mapping and photography missions using onboard GPS and related proprietary flight management software that allows the operator to plan safely and efficiently a mission in 3D, and then monitor it in real time. An camera attached via a vibration dampening gimbal takes a collection of high-definition still images that are used later to generate photographs, maps and contour lines of the surveyed area.

The four main characteristics of the UAS are:

a. Very light weight

The low kinetic energy significantly reduces the risk of hazardous situations. UAS is equipped with an optical flow sensor that accurately and reliably senses the crafts proximity to the ground and objects on the ground, like persons, and will maintain hover to avoid potential collisions.

b. Electric-powered

The UAS is electric-powered. 4 brushless engine technology makes quiet and reliable. The propellers easily flex away in case of contact with any object.

c. Semi-automatic flight

The artificial intelligence incorporated within the UAS autopilot system continuously analyzes data from the Inertial Measurement Unit and from the onboard GPS and takes care of all the aspects of the flight under the supervision of the operator.

d. Option for Manual control

Additionally, the UAS provide an override capability that allows the operator to take manually initiate autonomous actions during the flight such as "return home", "land" or, "hold and resume the mission". The operator can also suspend automated operations and take manual control of the aircraft should it become necessary to respond emergency circumstances, thanks to the remote controller provided with the system.

2. APPLICATIONS AND ADDED VALUE OF THE UAS

Mapping applications may include agricultural applications, mining, construction and survey/ GIS operations. There are many operational benefits related to the use of this solution:

a. The UAS bring safety to daily survey operations: there is no need for the humans to access dangerous working areas anymore (mines, quarries, or polluted sites). The missions can be programmed and reproduced reliably as often as needed for regularly updated maps.

b. The UAS is a cost-effective solution. It is cheaper to operate a UAS rather than an aircraft or other ground systems for the same results. Moreover, small UAS like the DJI Inspire can help Ag businesses and farmers face the growing needs of the population while reducing operational costs and environmental impact of launching full scale aircraft into the the air to perform the same work while consuming dozens of gallons of fuel per hour and releasing excess green house gasses into our atmosphere. This UAS will also enable offer the ability to take up new challenges - like water or environmental management through analysis of vegetation index maps.

c. Users can save time and work more efficiently by using a UAS. A mission does not need a long preparation time or long deployment constraints, or long waiting time for perfect weather conditions unlike, for example, the use of satellites. Initial results are accessible directly on-site, which is impossible with images provided by satellites or manned aircrafts.

d. Lastly, but possibly most importantly, is the efficiency aspects of these systems in the development, production and maintenance of the infrastructure related to the national energy issues that are being played out in the extraction of tight oil reserves in various parts of the United States.

3. APPLICABLE LEGAL STANDARD UNDER SECTION 333

a. Airworthiness assessment

DJI Inspire has demonstrated its respective airworthiness through many and varied national international projects, involving state/federal agencies or universities (among others the New Mexico State University: <https://newscenter.nmsu.edu/Articles/viewII0208/nmsu-uas-flighttest-center-conducts-dji-airworthiness-assessment>, and the US Army Corps of Engineers ("USACE") New Orleans, who coordinated with the Department of Army and the FAA to obtain all authorizations required in order to operate the Inspire 1 UAS). Moreover, DJI has obtained flight approvals for the DJI Inspire from the national civil aviation authority in many countries, including:

- Switzerland (flight approval for Visual Line of Sight "VLOS" operations)
- Canada (flight approval for VLOS operations)
- Australia (flight approval for VLOS operations)
- France (flight approval for Extended-VLOS operations)
- Germany (flight approval for VLOS operations)
- United Kingdom (flight approval for VLOS operations)
- Norway (flight approval for VLOS operations)
- Sweden (flight approval for VLOS operations)
- . Denmark (flight approval for VLOS operations)

b. Operating Conditions

Grant of the exemption to AFI will be subject to the following operating conditions, the operator proposed the following conditions and/or limitations, which were accepted by the FAA.

1. The UAV will weigh less than 55 lbs. Fully loaded with battery the total operational weight of the DJI Inspire is 6.25lbs as per official specifications published by the manufacturer DJI Inc.. Proposed operations of any other aircraft will require an amendment to the grant of exemption contemplated herein.
2. Flights will be operated within visual line of sight (VLOS) of a Pilot in Command (PIC) and/or Visual Observer (VO).
3. Maximum total flight time for each operational flight will be 30 minutes. Flights will be terminated at 25% battery power reserve should that occur prior to the 30 minute limit.
4. Flights will be operated at an altitude of no more than 400 feet AGL.
5. The UAS will only operate within a confined, preprogrammed survey area.
6. A briefing will be conducted in regard to the planned UAS operations prior to each day's flight mission. It will be mandatory that all personnel who will be performing duties within the boundaries of the safety perimeter be present for this briefing.
7. Pilot and observer will have been trained in operation of UAS generally and received up to-date information on the particular UAS to be operated as required in the respective the Manuals. The operator's manual will be maintained and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations of an exemption and the procedures outlined in the operator's manual, the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operator's manual. The operator may update or revise its operator's manual. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator upon request. The operator must also present updated and revised documents if it petitions for extension or amendment. If the operator determines that any update or revision would affect the basis for which the FAA granted this exemption, then the operator must petition for amendment to their exemption. The FAA's UAS Integration Office (AFS-80) may be contacted if questions arise regarding updates or revisions to the operator's manual.
8. PIC and VO will at all times be able to communicate by voice and/or text.
9. Written and/or oral permission from the relevant property holders will be obtained.

10. All required permissions and permits will be obtained from territorial, state, county or city jurisdictions, including local law enforcement, fire, or other appropriate governmental agencies.
11. If the UAS loses communications or loses its GPS signal, the UAS will have capability to return to a pre-determined location within the Survey Area and land.
12. The UAS will have the capability to abort a flight in case of unpredicted obstacles or emergencies.
13. Prior to each flight the PIC must inspect the UAS to ensure it is in a condition for safe flight. 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. The Ground Control Station, if utilized, must be included in the preflight inspection. All maintenance and alterations must be properly documented in the aircraft records.
14. 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 in accordance with the operator's manual. The PIC who conducts the functional test flight must make an entry in the UAS aircraft records of the flight. The requirements and procedures for a functional test flight and aircraft record entry must be added to the operator's manual.
15. The operator must follow the manufacturer's UAS aircraft/component, maintenance, overhaul; replacement, inspection, and life limit requirements. When unavailable, aircraft maintenance/component/overhaul, replacement, and inspection/maintenance requirements must be established and identified in the operator's manual. At a minimum, the following must be included in the operator's manual:
 - a. Actuators / Servos
 - b. Transmission (single rotor)
 - c. Powerplant (motors)
 - d. Propellers
 - e. Electronic speed controller
 - f. Batteries
 - g. Mechanical dynamic components (single rotor)
 - h. Remote command and Ground control station
 - j. Any other components as determined by the operator

16. If planned operations occur within 2 miles of Commercial Services Airport as defined by the FAA, the operator must obtain an Air Traffic Organization (ATO) issued Certificate of Waiver or Authorization (COA) prior to conducting any operations. This COA will also require the operator to request a Notice to Airman (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to the operation. Additionally, factory installed prevent the DJI Inspire from operating within a one mile radius of an airport.
17. 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.
18. The operator must develop procedures to document and maintain a record of the UAS maintenance, preventative maintenance, alterations, status of replacement/overhaul component parts, and the total time in service of the UAS. The preflight inspection must account for all discrepancies, i.e. inoperable components, items, or equipment, not covered in the relevant preflight inspection sections of the operator's manual.
19. Each UAS operated under this exemption must comply with all manufacturer Safety Bulletins.
20. Before conducting operations, the radio frequency spectrum used for operation and control of the UAS must comply with the Federal Communications Commission (FCC) or other appropriate government oversight agency requirements.
21. The UAV must remain clear and yield the right of way to all other manned operations and activities at all times (including, but not limited to, ultralight vehicles, parachute activities, parasailing activities, hang gliders, etc.).
22. UAV 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.
23. The UAS cannot be operated by the PIC from any moving device or vehicle.
24. The UAS 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.
25. The UAS may not operate in Class B, C, or D airspace without written approval from the FAA. The UAS may not operate within 5 nautical miles of the geographic center of a non towered airport as denoted on a current FAA-published aeronautical chart unless a letter of agreement with that airport's management is obtained, and the operation is conducted in accordance with a NOTAM as required by the operator's COA. The letter of agreement with the airport management must be made available to the Administrator upon request.

26. Any 1) incident, 2) accident, or 3) flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the Federal Aviation Administration's (FAA) 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.nts.gov. Further flight operations may not be conducted until the incident, accident, or transgression is reviewed by AFS-80 and authorization to resume operations is provided.

With this petition intended that AFI will be able to provide safe, reliable and accurate land surveying services and information to its clients with the use of the latest innovative technology associated with remotely piloted aircraft.

Your attention to this matter is appreciated.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "T. W. Tierney". The signature is fluid and cursive, with a distinct loop at the end.

Theodore W. Tierney

ANNEXA

EXEMPTION REQUEST AND EQUIVALENT LEVEL OF SAFETY SHOWINGS UNDER APPLICABLE RULES SUBJECT TO EXEMPTION

AFI requests an exemption from the following regulations as well as any additional regulations that may technically apply to the operation of the DJI Inspire UAS:

14 C.F.R. Part 21, Subpart H: Airworthiness Certificates 14 CFR § 91.203

Section 91.203 requires all civil aircraft to have a certificate of airworthiness. Part 21, Subpart H, entitled Airworthiness Certificates, establishes the procedural requirements for the issuance of airworthiness certificates as required by FAR§ 91.203(a). Given the size of the UAV, their very light weight and the limited operating area associated with its utilization, it is unnecessary to go through the certificate of airworthiness process under Part 21 Subpart H in order to achieve or exceed current safety levels.

Such an exemption meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the Reform Act. The Federal Aviation Act and Section 333 of the Reform Act both authorize the FAA to exempt aircraft from the requirement for an airworthiness certificate, upon consideration of the size, weight, speed, operational capability, and proximity to airports and populated areas of the UAS involved. An analysis of these different criteria demonstrates that the UAS operated without an airworthiness certificate, under the conditions proposed in that exemption, will be at least as safe, or safer, than a conventional aircraft with an airworthiness certificate.

14 C.F.R. § 45.23 & 14 C.F.R. § 45.29: Display of marks; size of marks

These regulations provide that each aircraft must display "N" and the aircraft's registration number in letters at least 3 inches high. Additionally, the aircraft must display the word "EXPERIMENTAL" in letters at least 2 inches high near the entrance to the cabin, cockpit, or pilot station. Given the size of the UAS, this requirement is impossible to match.

14. CFR §61.23: Medical certificates: Requirement and duration

Regulations provide that a person:

(1) Must hold a first-class medical certificate:

- When exercising the pilot-in-command privileges of an airline transport pilot certificate;
- When exercising the second-in-command privileges of an airline transport pilot certificate in a flag or supplemental operation in part 121 of this chapter that requires three or more pilots; or
- When serving as a required pilot flight crew member in an operation conducted under part 121 of this chapter if the pilot has reached his or her 60th birthday.

(2) Must hold at least a second class medical certificate when exercising:

- Second-in-command privileges of an airline transport pilot certificate in part 121 of this chapter (other than operations specified in paragraph (a)(1)(ii) of this section); or
- Privileges of a commercial pilot certificate

Given the size of the UAS, their structure, the limited flight area, and the safety features integrated in the autopilot (among others a flight termination system), AFI believes that an Equivalent Level of Safety can be reached if the operator has a valid driver's license.

14 C.F.R. §61.3: Requirements for certificates, ratings and authorizations
14 C.F.R. §61.113(a) & (b); 61.133(a): Private Pilot Privileges and Limitations; Pilot in Command; Commercial Pilot Privileges and Limitations

The regulation provides that no person may serve as a required pilot flight crew member of a civil aircraft of the United States, unless that person:

(1) Has a pilot certificate or special purpose pilot authorization issued under this part in that person's physical possession or readily accessible in the aircraft when exercising the privileges of that pilot certificate or authorization. However, when the aircraft is operated within a foreign country, a pilot license issued by that country may be used. The regulation provides also 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;

(2) The aircraft does not carry passengers or property for compensation or hire.

Given the safety features of the UAS and the fact that the missions are pre-programmed and monitored in real-time with a specific flight management software, AFI proposes that operators of the UAS should not be required to hold a commercial or private pilot certification. Instead, operators should be required to:

- Have completed the UAS manufacturers training program for operation of the UAS. The manufacturer's training program for eBee operators has been already satisfactorily reviewed through the Application for Airworthiness Qualification Level (AQL) 3 Airworthiness Release (AWR). The equivalent level of safety will be achieved by having an operator trained UAVs manufacturer, and using the integrated features of the aircraft to maintain a high level of safety during the different missions.

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

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

14 C.F.R. §91.9: Civil aircraft flight manual, marking, and placard requirements

■ ■

The equivalent level of safety will be achieved by keeping a hard copy of the user manual in close proximity to the operator.

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

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

The regulation provides that "No person may operate a civil aircraft that is being used for flight instruction unless that aircraft has fully functioning dual controls."

The equivalent level of safety during the in-flight training will be achieved by the manufacturer or affiliate providing the training as described in the manufacturer's training program and through the use of experienced and qualified instructors familiar with the UAS.

14 CFR §91.119: Minimum Safe Altitudes

Section 91.119 establishes safe altitudes for operation of civil aircraft. The exemption requests authority to operate at altitudes up to 400 AGL, It will however be operated in a restricted area with security perimeter, where buildings and people will not be exposed to operations without their pre-obtained consent

The equivalent level of safety will be achieved given the size, weight, speed of the UAS as well as the location where it is operated. No flight will be taken without the permission of the property owner or local officials.

Compared to flight operations with aircraft weighing far more than those proposed herein and the lack of flammable fuel, any risk associated with these operations is far less than those presently presented with conventional aircraft.

14 CFR 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 UAS may not have a barometric altimeter, but instead a GPS altitude read out, an exemption is requested.

An equivalent level of safety will be achieved by the operator confirming the altitude of the launch site shown on the GPS altitude indicator before flight.

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

The regulation provides that no person may begin a flight in an airplane under day-VFR conditions unless there is enough fuel to fly to the first point of intended landing and to fly after that for at least 30 minutes. As the UAS are electric-powered, this requirement is inapplicable. In any event, given the contemplated operations, AFI believes that an equivalent level of safety is already achieved with the specific procedure preventing the UAS accepting a take-off

order is the battery level is below a given value. Moreover, the manufacturers have integrated low and critical battery level warnings and implemented a "return to home" action in these situations.

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

This regulation provides as follows:

- No person may operate a civil aircraft unless it has an appropriate and current airworthiness certificate.
- No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under §91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

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

14 CFR Subpart E (91.401 - 91.417): Maintenance, Preventive Maintenance, and Alterations

The regulation provides that the operator is primarily responsible for maintaining the aircraft in an airworthy condition, including compliance with Parts 39 and 43. Paragraphs 91.407 and 91.409 require the aircraft to be "approved for return to service by a person authorized under 43.7" after maintenance and inspection. Section 91.409 requires an annual inspection for the issuance of an airworthiness certificate. Section 91.417 requires the owner or operator to keep records showing certain maintenance work that has been accomplished by certificated mechanics, under Part 43, or licensed pilots and records of approval of the aircraft for return to service.

AFI proposes that the maintenance of the UAS will be accomplished by the owner or the operator according to the manufacturers user manual

Given that these section and Part 43 apply only to aircraft with an airworthiness certificate, these sections will not apply to the applicant. Maintenance will be accomplished by the operator pursuant to the flight manual and operating handbook as referenced herein. An equivalent level of safety will be achieved because these small UAS are very limited in size and will carry a small payload and operate only in restricted areas for limited periods of time. If mechanical issues arise the UAS can land immediately and will be operating from no higher than 400 feet AGL. 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.