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

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

July 17, 2015

Exemption No. 12069
Regulatory Docket No. FAA–2015–1218

Mr. Joseph Busalacchi
1320 Nancy Drive
Tallahassee, FL 32301

Dear Mr. Busalacchi:

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 22, 2015, you petitioned the Federal Aviation Administration (FAA) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial photography, filming, and scientific data collection.

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 S-1000, 3D Robotics Aero-M, X8-M, Zeta Science FX79, and 3D Robotics Y6.

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 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, Joseph Busalacchi 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, Joseph Busalacchi is hereafter referred to as the operator.

[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.

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 S-1000, 3D Robotics Aero-M, X8-M, Zeta Science FX79, and 3D Robotics Y6 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 July 31, 2017, unless sooner superseded or rescinded.

Sincerely,

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

Enclosures

April 22, 2015

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

Joseph Busalacchi Petition for Exemption to Operate
Unmanned Aircraft Systems for Aerial Photography, Filming and Scientific Data collection

FAA Regulatory Docket

Re: Exemption Request Pursuant to Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations from: 14 CFR 21; 14 CFR 45.23(b); 14 CFR 61.113(a)& (b); 14 CFR 91.7(a); 14 CFR 91.9(b)(2); 14 CFR 91.103;14 CFR 91.109; 14 CFR 91.119; 14 CFR 91.121; 14 CFR 91.151(a); 14 CFR 91.203 (a) & (b); 14 CFR 91.405 (a); 14 CFR 91.407 (a) (1); 14 CFR 91.409 (a)(2); 14 CFR 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, Joseph Busalacchi, seeks an exemption from Federal Aviation Regulations ("FARs") to allow commercial operation of an sUAS, 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.

Joseph Busalacchi provides high quality imagery and data that can be used independently or in the case of surveying and modelling, can be combined to produce precision digital point clouds, triangle models, and contour maps of the surveyed area. Applications for these sUAS include assistance to law enforcement agencies for criminal investigation, traffic accident reconstruction and tactical support, emergency services emergency site management in cases of natural and manmade disasters as well as search and rescue, environmental monitoring, wildlife monitoring and enforcement, inspection of sensitive infrastructure including oil and gas pipelines, flare stacks, power lines, communications towers, wind turbines, and surveying tasks such as precision agriculture, mining, transportation, and forestry. Use of Mr. Busalacchi for these emergency services, inspection and surveying applications reduces the need to operate conventional aircraft, providing data more safely, quickly, accurately, economically, and with reduced environmental impacts.

Based on the small size of Petitioner's UAS, the qualifications and experience of Mr. Busalacchi, and the restricted, sterile environment within which Mr. Busalacchi will operate, the requested exemptions fall squarely within the zone of safety envisioned by Congress and set forth in Section 333. Additionally, the enhanced safety achieved by replacing significantly larger manned aircraft carrying crew and flammable fuel with small UAS carrying no passengers or crew and operated under the specific guidelines and procedures proposed by Petitioner gives the FAA good cause to find that the UAS operations enabled by the instant Petition are in the public interest. Thus, the requested exemptions should be granted.

The requested exemption would permit Joseph Busalacchi to pursue his current interests in providing services via small UAS in the following areas list below and in the public interest statement above:

1. Aerial photography and/or video for public and/or private use including real estate, architecture, land surveying, engineering, precision agriculture and collection of scientific data in support of research, conservation and humanitarian concerns.
2. Aerial inspection/photography of residential/commercial structures under contract with the owners or local government authority.
3. Aerial video/photography or providing live video feed to assist with search and rescue operations in cases of an emergency or natural disaster only when the local authorities or government has requested it by contract or donation.
4. The ability to offer training on the technological and methodological aspects of aerial data capture to individuals from public or private organizations. This does not encompass training in the use of the sUAV's or certification of UAV operators but on the applications surrounding sensor configurations and mapping methods.

Mr. Busalacchi states that all sUAS flights will occur over private or controlled access property will do so with the property owner's prior consent and knowledge. Only persons who have consented or otherwise agreed to be in the area where photography and videography will take place will be captured.

The name and address of the applicant is:
Joseph Busalacchi
1320 Nancy Drive
Tallahassee, Florida 32301
Phone: 352.256.6303
Email: joey.busalacchi@gmail.com

Regulations from which the exemption is requested:
14 CFR Part 21;
14 CFR 45.23 (b);
14 CFR 61.113(a) & (b);
14 CFR 61.133 (a);
14 CFR 91.7 (a);
14 CFR 91.9 (b) (2);
14 CFR 91.103;
14 CFR 91.109;
14 CFR 91.119;
14 CFR 91.121
14 CFR 91.151 (a);
14 CFR 91.203 (a) & (b);
14 CFR 91.405 (a);
14 CFR 91.407 (a) (1);
14 CFR 91.409 (a) (2);
14 CFR 91.417 (a) & (b);

Section 333: Statutory Authority

Section 333, titled "Special Rules for Certain Unmanned Aircraft Systems", provides a mechanism for seeking expedited FAA authorization of safe civil UAS operations in the National Airspace System ("NAS"). Section 333(a) states that the FAA "shall determine if certain unmanned aircraft systems may operate safely in the national airspace system before completion of the [comprehensive] plan and rulemaking required by section 332(b)(1) of this Act or the guidance required by section 334 of this Act." In Section 332(b)(1), Congress made it clear that Section 333 provides a mechanism for "expedited operational authorization." The FAA has committed to complying with this mandate by granting several petitions almost identical to the one at hand. See, e.g., Exemption No. 11062, Regulatory Docket No. FAA-2014-0352 (granting regulatory exemptions to Astraeus Aerial for operation of unmanned aircraft systems for the purpose of filming for the motion picture and television industry). Section 333(b) identifies several factors that the FAA should consider in determining whether commercial UAS operations should be approved. These include 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 users of the [NAS] or the public or pose a threat to national security." See Section 333(b).

Section 44701(f)

In addition to the specific authority conferred by Section 333, the FAA Administrator has general authority to grant exemptions from the FAA's safety regulations and minimum standards when the Administrator decides a requested exemption is in the public interest. See U.S.C. § 44701(f).

The sUAS's proposed for use in this exemption request will be both fixed wing and multi-rotor craft, including models: 3DRobotics Aero-M and Y6; Zeta Science FX-79; and DJI S1000+. These craft weigh no more than 55lbs. including payload. Under normal conditions they operate at speeds of no more than 100 Mph or 87 Knots. They will operate in line of sight only and only by a qualified operator obeying all other local and federal laws and terms of this exemption.

The sUAS's will be operated in the field with both a Pilot in Command (PIC) and a ground-based Visual Observer (VO) in accordance with FAA Policy N 8900.227 Section 14 "Operational Requirements for UAS" with the following additional restrictions:

- All operations will occur at no more than 400 ft AGL. Altitude reported in feet Above Ground Level.
- Operations will be conducted over private property with the permission of the land owner
- All required permits will be obtained from state and local government prior to operation
- The aircraft will not be operated over urban or populated areas
- The aircraft will not be operated at air shows or over an open-air assembly of people
- The aircraft will not be operated over heavily trafficked roads
- The aircraft will not be operated within 5 NM of an airport or heliport
- Operations will be limited to day, visual meteorological conditions
- Aircraft will remain within Visual Line of Sight at no greater than 1 NM of the PIC at all times
- While the aircraft is airborne, the VO will be positioned within voice distance to the PIC the best
- All Flight operations will 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 will 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

Mr. Busalacchi, as the Pilot in Command (PIC) during commercial operations described herein, will hold at minimum a FAA Sport Pilot certificate and hold a current and valid U.S. driver's license as evidence of medical eligibility or a third class airmen's medical certificate. Mr. Busalacchi will have a sound understanding of FARs, pre-flight inspections, maintenance and repair, operations within airspace, as well as being trained to high safety standards.

Currently, there are no standards for either private or commercial UAS pilot certificates, knowledge of airspace regulations acquired from FAA sport pilot written(knowledge test) and practical (flight test) courses and dexterity in the control and operation of the UAS acquired from actual operation of the aircraft will be the most important factors in establishing an equivalent level of safety. According to the FAA, "the FAA considers the overriding safety factor for the limited operations proposed by the petitioner to be the airmanship skills acquired through UAS-specific flight cycles, flight time, and specific make and model experience, culminating in verification through testing." See Exemption No. 11062, Regulatory Docket No. FAA-2014-0352, at p. 18. With those factors in mind, Mr. Busalacchi shall be required to meet several conditions and limitations as outlined in the flight operations manual, including the following:

- Joseph Busalacchi will have accumulated and logged a minimum of 200 flight cycles and 25 hours of total time as a UAS pilot and at least 10 hours logged as a UAS pilot with a similar UAS type (single blade or multirotor).
- Joseph Busalacchi will have accumulated and logged a minimum of five hours of flight time with the specific make and model of the UAS to be utilized for operations under the exemption and three take-offs and landings in the preceding 90 days.

I submit that the combination of the aircraft's light weight, flight performance, fully qualified flight crew and strict operation under the guidelines established in 8900.227, the FAA can have confidence that Mr. Busalacchi will have an equivalent or greater level of safety of manned aircraft performing the same mission.

I am prepared to modify or amend any part of this request to satisfy the need for an equivalent level of safety. We look forward to working with your office. Please contact us at any time if you require additional information or clarification.

Sincerely,

Joseph Busalacchi

Appendices:

A. Exemption Request and Equivalent Level of Safety
B. Small Unmanned Aerial System (sUAS's) Descriptions
C. sUAS User Manuals

APPENDIX A

EXEMPTION REQUESTS AND EQUIVALENT LEVEL OF SAFETY

Joseph Busalacchi requests an exemption from the following regulations as well as any additional regulations that may technically apply to the operation of the sUAS's described herein:

14 CFR Part 21, Subpart H: Airworthiness Certificates

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

The sUAS's to be operated here are less than 55 lbs. fully loaded, carries neither a pilot nor passenger, carries no explosive materials or flammable liquid fuels, and operates exclusively within a secured and designated area. Unlike other civil aircraft, operations under this exemption will be tightly controlled and monitored by both the operator and under the requirements and in compliance with local public safety requirements. These safety enhancements provide a greater degree of safety to the public and property owners than conventional operations conducted with airworthiness certificates issued under 14 C.F.R. Part 21, Subpart H. Lastly, application of these same criteria demonstrates that there is no credible threat to national security posed by the sUAS's, due to its size, speed of operation, location of operation, lack of explosive materials or flammable liquid fuels, and inability to carry a substantial external load.

14 CFR 91.203(a) & (b) Civil aircraft: Certifications required

The regulation provides that an airworthiness certificate, with the registration number assigned to the aircraft and a registration certificate must be aboard the aircraft. Additionally, subparagraph (b) provides that the airworthiness certificate be "displayed at the cabin or cockpit entrance so that it is legible to passengers or crew." The sUAS's described herein are

too small to carry documentation, does not have an entrance, and is not capable of carrying passengers or crew. To obtain an equivalent level of safety and meet the intent of 91.203, we propose that documents deemed appropriate for this aircraft by the FAA will be co-located with the crew at the ground control station and available for inspection upon request. In order to identify the aircraft, we propose that the information found on airworthiness and registration certificates be permanently affixed to the aircraft via placard:

Manufacturer: Name and Manufacturer of sUAS
Model: Model Number

Registered to:
Joseph Busalacchi
1320 Nancy Drive
Tallahassee, Florida 32301

If found please contact: (352)256-6303

14 CFR 45.23 (b) Marking of the Aircraft

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. The sUAS's described herein do not have an entrance in which the word "EXPERIMENTAL" can be placed, and may not have a registration number assigned to it by the FAA.

We propose to achieve an equivalent level of safety by including the word "EXPERIMENTAL" on the top of the aircraft, where the PIC, VO and others in the vicinity of the aircraft while it is preparing for launch will be able to see the designation. Additionally, we feel that the permanent placard discussed in the previous paragraph will provide the aircraft's registration information should it be found on the ground. Finally, we will display at the ground station a high contrast flag or banner that contains the words "Unmanned Aircraft Ground Station" in letters 3 inches high or greater. Since the aircraft will operate within 1 NM of the ground station, the banner should be visible to anyone that observes the aircraft and chooses to investigate its point of origin.

14 C.F.R. 91.7(a): Civil Aircraft Airworthiness

The regulation requires that no person may operate a civil aircraft unless it is in airworthy condition. As there will be no airworthiness certificate issued for the aircraft, should this exemption be granted, no FAA regulatory standard will exist for determining airworthiness.

Given the size of the aircraft for maintenance and use of safety checklists prior to each flight an equivalent level of safety will be provided.

14 CFR 91.9 (b) (2) Civil Aircraft Flight Manual in the Aircraft

This regulation provides that no person may operate an aircraft unless a current, approved flight manual is in the aircraft. We assume that the intent of this requirement is to ensure that flight manual information is available to the aircrew while operating the aircraft. We request an exemption to this requirement since the aircraft is not only too small to carry documentation, the documentation would not be available to the crew.

To obtain an equivalent level of safety and meet the intent of 91.9, we propose that a current, approved Flight Manual for each of the sUAS's described herein must be available to the crew at the ground station anytime the aircraft is in or preparing for flight. **See Appendix C**.

14 CFR 61.113 (a) & (b) Private pilot privileges and limitations: Pilot in Command

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.

Our proposed operations meet the requirements of 8900.227 paragraph 16 (c) (2) (c) "Operations without a pilot certificate" in which the PIC is required to complete "FAA Sport pilot ground instruction" and pass "the FAA Sport Pilot written examination." Since there are currently no means available for the pilot of a UAS to gain the experience in an equivalent category and class in order to apply for a commercial pilot's license, Mr. Busalacchi proposes to generate an equivalent level of safety by completing, at a minimum, FAA Sport pilot ground instruction and pass the FAA Sport Pilot written and practical examination in addition to completing all sUAS pilot requirements set forth in the Petition for Exemption above. Since the aircraft cannot carry passengers or property, we feel we meet the intent of 61.113 Subparagraph (b) even though the intent of this application is to conduct a business.

14 CFR 91.109 Flight instruction

Section 91.103 provides that no person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls. sUAS's and remotely piloted aircraft, by their design do not have fully functional dual controls. Flight control is accomplished through the use of a control box that communicates with the aircraft via radio communications. The FAA has approved exemptions for flight training without fully functional dual controls for a number of aircraft and for flight instruction in experimental aircraft. See Exemption Nos.5778K & 9862A.

The equivalent level of safety provided by the fact that neither a pilot nor passengers will be carried in the aircraft and by the size and speed of the aircraft.

14 CFR 91.119 Minimum safe altitudes

The regulation provides that over sparsely populated areas the aircraft cannot be operated closer than 500 feet to any person, vessel, vehicle, or structure. Since the aircraft will be operating at a maximum of 400 feet AGL, Mr. Busalacchi cannot comply with this requirement. To provide an equivalent level of safety Mr. Busalacchi will only fly over private property with the permission of the land owner. The land owner will be briefed of the expected route of flight and the associated risks to persons and property on the ground. We maintain that due to the small size of the sUAS's described herein, the hazard to persons, vessels, vehicles, and structures is not comparable to manned aircraft and should be considered in granting the exemption.

Consideration about risks related to ground impacts. The sUAS's described herein will not be operated over congested areas nor over any open air assembly of persons. In the event of power unit failure and operating at 400 feet altitude, Mr. Busalacchi as PIC will be able to conduct an emergency landing without undue hazard to persons or property on the ground.

14 CFR 91.121 Altimeter settings

The regulation provides that aircraft shall maintain cruising altitudes by reference to an altimeter setting available within 100 nautical miles of the aircraft. The aircraft will fly below 400 feet AGL and will not need to maintain hemispherical cruising altitudes in order to de-conflict with other aircraft. As such, an appropriate altimeter measurement presented to the pilot should be Above Ground Level and should be based on the barometric pressure at the point of launch. To provide an equivalent level of safety, the sUAS's described herein AGL altimeter(s) will be set to zero on the ground prior to every flight. Since the average flight will be 8-60 minutes, even rapid changes in barometric pressure will have limited effect on the safety of the flight.

14 C.F.R. § 91.103: Preflight action

Seeks an exemption from 14 CFR 91.103, which requires a PIC to become familiar with specific information before each flight, including information contains in the FAA-approved Flight Manual on board the aircraft. While the PIC will be familiar with all of the information necessary to safely conduct the flight, an exemption is requested to the extent that an FAA-approved Flight Manual is required.

14 CFR 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 40 minutes of powered flight. To meet the 30-minute reserve requirement in 14 CFR 91.151, sUAS flights would be limited to approximately 10 minutes in length. Given the limitations on the UAS's proposed flight area and the location of its proposed operations within a predetermined area, a longer time frame for flight in daylight or night VFR conditions is reasonable.

Joseph Busalacchi 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 where only people and property owners or official representatives who have signed waivers will be allowed, with less than 30 minutes of reserve fuel, 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. Additionally, limiting sUAS flights to 10 minutes would greatly reduce the utility for which the exemption will be granted.

Mr. Busalacchi believes that an equivalent level of safety can be achieved by limiting flights to 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 CFR 91.405 (a); 91.407 (a) (1); 91.409 (a) (2); 91.417 (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 the applicant. The operator pursuant to the flight manual and operating handbook will accomplish maintenance. An equivalent level of safety will be achieved because these small UASs are very limited in size and will carry a small payload and operate only in restricted areas for limited periods of time. If mechanical issues arise the UAS can land immediately and will be operating from no higher than 400 feet AGL. As provided in the Manual, the operator will ensure that the UAS is in working order prior to initiating flight, perform required maintenance, and keep a log of any maintenance performed. 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.

APPENDIX B

sUAS DESCRIPTIONS

Joseph Busalacchi requests the sUAS's to be used are as follows but not limited to providing they are within the scope of the exemption granted by the FAA. Mr. Busalacchi 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. Mr. Busalacchi must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption. If Mr. Busalacchi determines that any update or revision would affect the basis upon which the FAA granted this exemption, then Mr. Busalacchi 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.

Fixed Wing sUAS's:

3D Robotics Aero-M Specifications:

- **Wing Span:** 74 inches/1900 mm
- **Length:** 51 inches / 1300 mm
- **Cruise Speed:** 25 mph / 40km/hr
- **Max Speed:** 62 mph / 100 km/hr
- **Stall Speed:** 9 mph / 15 km/hr
- **Autonomous capabilities**: Auto-Return to Home if lost communications or lost data link; Auto-Loiter, Auto-Landing, Emergency Auto-Landing if Low Power Emergency
- **Maximum Range:** 6+ miles / 10+ km
- **Maximum Take-off Weight:** 7.7 lbs. / 3500 grams
- **Maximum Wind Speed:** 25 mph
- **Normal Flight Time:**40 minutes hours; 4S 6000 mAh 35C LiPo
- **Payload:** 1.1 lbs.

Zeta Science FX79 Specifications:

- **Wing Span:** 79 inches/2000 mm
- **Length:** 33.93 inches / 862 mm
- **Cruise Speed:** 25 mph / 40km/hr
- **Max Speed:** 50 mph / 80 km/hr
- **Stall Speed:** 12 mph / 19 km/hr
- **Autonomous capabilities**: Auto-Return to Home if lost communications or lost data link; Auto-Loiter, Auto-Landing, Emergency Auto-Landing if Low Power Emergency
- **Maximum Range:** 6+ miles / 10+ km
- **Aircraft Weight w/ battery:** 9.7 lbs. / 4535 grams

- **Payload:** 1.5 lbs.
- **Maximum Take-off Weight:** 11.2 lbs. / 5080 grams
- **Maximum Wind Speed:** 40 mph
- **Normal Flight Time:** 1 hour; 4S 6000 mAh 35C LiPo

Muti-Rotor sUAS's:

3D Robotics Y6:

- **Width:** 13.7 in/348 mm
- **Length:** 20.1 in/ 511 mm
- **Height: 11.8 in/300 mm**
- **Cruise Speed:** 22 mph / 36km/hr
- **Approx. Max Air Speed:** 30 mph / 50 km/hr
- **Minimum Airspeed:** 0 mph / 0 km/hr
- **Maximum Range:** 0.5 miles / 0.8 km
- **Multi-Rotor Weight w/ battery:** 4.7 lbs. / 2120 g
- **Payload Capacity: 1.1 lbs/500g**
- **Maximum Take-off Weight:** 5.8 lbs./2630 g
- **Autonomous capabilities**: Auto-Return to Home if lost communications or lost data link; Auto-Loiter, Auto-Landing, Emergency Auto-Landing if Low Power Emergency
- **Maximum Wind Speed:** 30 mph
- **Normal Flight Time:** 15 minutes; Max payload: 8 minutes hours; various battery configurations available

DJI S100+:

- **Width: 41 in**/1045 mm
- **Length: 41 in**/ 1045 mm
- **Top Diameter:13 in/338mm**
- **Height: 24 in/ 609 mm**
- **Cruise Speed:** 22 mph / 36km/hr
- **Approx. Max Air Speed:** 30 mph / 50 km/hr
- **Minimum Airspeed:** 0 mph / 0 km/hr
- **Maximum Range:** 1+ miles / 1.6+ km
- **Multi-Rotor Weight w/ battery:** 11.5 lbs. / 5200 grams
- **Payload Capacity: 12.5 lbs/5660 g**
- **Maximum Take-off Weight:** 24 lbs/11000g
- **Autonomous capabilities**: Auto-Return to Home if lost communications or lost data link; Auto-Loiter, Auto-Landing, Emergency Auto-Landing if Low Power Emergency
- **Normal Flight Time:** 15 mins; 6S 15,000mAh LiPo

Power Source:
Lithium polymer or Lithium ion batteries. Charging of batteries can be completed via: standard wall outlet, direct connection to vehicle battery, or via the vehicle's cigarette lighter.

Propulsion System:
The sUAS's described herein are powered by electric direct drive brushless DC motors.

Autonomous Flight:
The key element of the sUAS's described herein is the system's autopilot which automatically compensates for wind versus relying on the operator's sense of feel for what the impact of the wind is at launch or at the altitude the system is flying. All flight operations are GPS and autopilot controlled making the system extremely easy to operate and navigate. The autopilot serves in a "cruise control" like manner limiting the operator from placing any the sUAS's described herein in an unusual attitude while maintaining desired altitude. At any point if the signal between the Ground Control Station (GCS) and the aircraft is lost, the aircraft will return to the designated home station and loiter or land as preprogrammed.

Landing styles/types – Aided or Autonomous:

- In "**Aided**" landing mode the autopilot continues to assist the pilot in maintaining altitude and stability as the pilot controls the fixed wing sUAS to the desired landing location.
- In "**Autonomous**" Landing mode without human intervention, the fixed wing sUAS autopilot can land the aircraft consistently within a narrow and limited landing area, even in crosswinds. The autopilot intelligently manages the landing pattern and glideslope to minimize overshoot or undershoot. If signal is lost and cannot be reestablished for some reason, the autopilot will initially return to home location and loiter.

Onboard Flight Instruments:
The sUAS's described herein are equipped with an Inertial Navigation System (3axis gyroscope, 3axis magnetometer, GPS receiver, and static pressure sensor and secure radio link to the operator).

Onboard Computer Systems:
The sUAS's described herein are equipped with onboard computer systems to monitor, control, and communicate the essential fight status to the PIC and VO.

Frequency Allocations:
915 MHz, 2.4 GHz OR 5.8 GHz

Navigation System:
Specific maps can be downloaded to the display screen (such as air sectional and geographic maps) which are overlaid with GPS positional data. Waypoints can be created before and during flight operations, thus creating specific locations and flight sequences for the aircraft. During flight waypoints can be clicked and dragged to change their location and/or altitude.

Command and Control Systems:
All missions will be flown in using a handheld radio transmitter in conjunction with ground control station (GSC) computers providing PIC and VO all of the essential flight data via telemetry from the sUAS at least once per second.

GCS Data Displayed:

- sUAS Barometric Altitude
- sUAS Bearing
- sUAS Heading
- sUAS Ground Speed
- sUAS Climb Rate
- sUAS Flight Time
- sUAS Data Link Quality
- sUAS Position
- GPS Number of Satellites
- sUAS Battery Level
- Altitude
- Local Time
- Direction to Home
- Active Flight Mode
- sUAS Status
- Pitch/Roll/Yaw Horizon

Emergency Procedures and System Failures:

- **Sensor Failure-** Failure of onboard flight instruments/sensors will degrade the UAS performance and will result in either a fatal critical response or a non-fatal critical response, depending on the nature and severity. If the UAS becomes unstable due to sensor failure, this may result in loss of performance or features but still allow for stable Pilot in Command flight, an automated landing or in extreme cases a fatal response.
- **Motor Failure-** This will cause a fatal response in the UAS flight performance if one or more motors fails.
- **Airframe Failure-** Depending on the nature and severity, this may result in decreased flight performance or a fatal response.
- **Navigation System Failure-** In a navigation system failure, degraded GPS will result in a response warning to the pilot where-by the system would be flown in manual mode. This

will result in degraded GPS position performance, manual Pilot in Command flight will not be effected.

- **Power Failure** -A complete battery failure which results in power loss to the UAS will result in a fatal response.
- **Low Battery Condition** - Operator will be alerted of a low battery condition and will land the
- UAS as soon as able.
- **Critical Battery Condition** - Operator will be alerted of a Critical low battery condition and will land the UAS as soon as able, the UAS will begin to descend at a controlled rate.
- **Line of Sight Loss** -All flight operations will be conducted with the UAS within visual sight of the pilot. If the pilot's view becomes obstructed and line of sight is lost, the pilot may instruct the
- UAS to hover in place until line of sight is re-established, to return to the takeoff position, or to land at the current position.
- **Security -** The system and communication links are encrypted by the manufacturer's proprietary software.

Appendix C

sUAS User Manuals

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(User Manuals Attached as Separate Files)