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

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

August 26, 2015

Exemption No. 12619
Regulatory Docket No. FAA–2015–2141

Mr. Edward Roske
Digital GIS, LLC
1164 Sedgewood Circle
West Melbourne, FL 32904

Dear Mr. Roske:

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 letters dated May 20, 2015 and August 14, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Digital GIS, LLC (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial surveying, photography, cinematography, and inspections.

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 3D Robotics Solo and Sensefly eBee.

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, Digital GIS, LLC is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to

[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.

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, Digital GIS, LLC is hereafter referred to as the operator.

Failure to comply with any of the conditions and limitations of this grant of exemption will be grounds for the immediate suspension or rescission of this exemption.

1. Operations authorized by this grant of exemption are limited to the 3D Robotics Solo and Sensefly eBee 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 August 31, 2017, unless sooner superseded or rescinded.

Sincerely,

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

Enclosures

May 20, 2015

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

ELECTRONIC SUBMISSION

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (herein referred to as Reform Act) and 14 CFR Part 11, Digital GIS, hereby applies for an exemption from the listed Federal Aviation Regulations (FARs) to allow commercial operation of sUAS for precision aerial surveying, 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.

Digital GIS is a consulting firm that provides geospatial, surveying, geosciences, inspection, photographic, and cinemagraphic services to a wide range of industries in the United States. The company leverages the capacities of mapping software, GPS systems, and surveying equipment to provide these services to industries that rely on them for regulatory compliance, public safety, and asset management. Being positioned in this highly competitive industry requires a significant investment in the aforementioned software and hardware products, but to also be aware of forthcoming technological developments. The sUAS is among a group of several technological developments that Digital GIS considers to be a tool that will have a positive impact on the way we perform data collection, photogrammetry, and visual documentation methodologies, all of which are services we provide for our customers.

As detailed in this document, the requested exemption would permit the operation of sUAS under controlled conditions in airspace that is 1) limited, 2) predetermined, 3) controlled as to access and 4) would provide safety enhancements to the already best practices safety protocols followed by Digital GIS. Approval of this exemption would thereby enhance safety and fulfill the Secretary of Transportation's responsibilities to "…establish requirements for the safe operation of such aircraft systems in the national airspace system." Section 333(c) Reform Act.

The name and address of the applicant is:

Digital GIS, LLC
Edward Roske
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West Melbourne, FL 32904
321-795-3240
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Regulations from which the exemption is requested:
14 CFR Part 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 91.111(a)
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 407(a)(1)
14 CFR 409(a)(2)
14 CFR 417(a) & (b)

AUTHORITY FOR EXEMPTIONS

The Federal Aviation Act expressly grants the FAA authority to issue exemptions. This statutory authority includes exempting civil aircraft, as the term is defined under §40101 of the Act, including sUASs, from the requirement that all civil aircraft must have a current airworthiness certificate.

The Administrator may grant an exemption from a requirement of a regulation prescribed under subsection (a) or (b) of this section or any sections §44702-44716 of this title if the Administrator finds the exemption in the public interest. 49 USC §44701(f). See also 49 USC §44711(a); 49 USC §44704; 14 CFR 91.203(a)(1).

Section 333(b) of the Reform Act assist the Secretary in determining whether sUASs may operate in the national airspace system without creating a hazard to the user, the public, or a threat to national security. In making this determination, the Secretary must consider:

- The sUAS' size, weight, speed and operational capability;
- Whether the sUAS operates within the visual line of sight of the operator;
- Whether the sUAS operates outside of highly populated areas and away from close proximity to airports.

Reform Act 333(a). If the Secretary determines that a sUAS "may operate safely in the national airspace system, the Secretary shall establish requirements for the safe operation of such aircraft in the national airspace system." *Id*. 333(c).

Digital GIS' *sUAS Fleet Specifications*

Digital GIS' fleet of sUAS consist of the following characteristics that illustrate their minimal impact to human beings, manned aircraft, and infrastructure:

1. ***DJI F550 Flamewheel Multi-rotor (6-propeller hexagonal frame, plastic/metals):***

    - Total weight with maximum allowable payload: 6.5lbs,
    - Dimensions: Greatest width: 550mm (21.65in), Height (with landing gear): 10.5”
    - Maximum speed: 30kts
    - Battery system (4-cell, 14.8 volt, 4000maH lithium-polymer) provides eight (8) to twelve (12) minutes of flight time, and one (1) minute of reserve for RTH function if necessary,
    - NAZA-M V2 Flight Controller (with GPS and compass) is installed on this sUAS, and is the most advanced system currently available, with latest firmware release,
    - Use of First-Person View (“FPV”) for advanced flight safety; provides real-time video downlink from sUAS to video monitor on transmitter.

2. ***DJI Spreadwings:***

    - Weight: 4400 g
    - Diagonal Size: 1045 mm
    - Max Speed: 16m/s
    - Max altitude: 6000 m
    - Max distance:2000 m
    - Max flight time: 15 minutes

3. ***DJI Phantom:***

    - Weight: 1280 g
    - Diagonal Size: 590 mm
    - Max Speed: 16m/s
    - Max altitude: 6000 m
    - Max distance:2000 m

4. ***DJI Inspire:***

    - Weight: 2935 g
    - Dimensions: 438x451x301 mm
    - Max Speed: 22m/s
    - Max altitude: 4500 m
    - Max distance:2000 m
    - Max flight time: 18 minutes

5. ***Tarot T810 Foldable Multi-rotor (6-propeller hexagonal frame, carbon fiber):***

    - Total weight with maximum allowable payload: 9.3lbs,
    - Dimensions: Greatest width: 810mm (31.9in), Height (with landing gear): 14.25”
    - Maximum speed: 30kts
    - Battery system (2x 6-cell, 22.2 volt, 5000maH lithium-polymer) provides fifteen (15) minutes of flight time, and two (2) minutes of reserve flight time,
    - NAZA-M V2 Flight Controller is also installed on this unit,
    - Use of First-Person View (“FPV”) for advanced flight safety; provides real-time video downlink from sUAS to video monitor on transmitter.

6. ***Aeryon Skyranger:***

- Total weight with maximum allowable payload: 5.3lbs,
- Dimensions: Greatest width: 40 in., Height (with landing gear): 9.3 in.
- Battery system provides fifty (50) minutes of flight time,
- Navigation lighting, LED Red/Green and Red/NIR
- Autonomous capabilities, controlled in low-latency all-digital network, secured network pairing AES 256 bit encryption
- Radio linkage to 1.9 miles, extendible beyond 3.1 miles

7. ***3DRobotics Solo:***

- Max Flight time: 25minutes without payload, 20 min with payload
- Dimensions: 10 inch tall, 18 inch motor to motor
- Weight: 1500g, 1800g with payload
- Max distance: 0.5 miles
- Flight controls: WiFi 2.4 GHz
- Max speed: 55 mph
- Max payload 420 g
- Max altitude: 400ft

8. ***3DRobotics X8***

- Max Flight Time: up to 14 minutes
- Flight area: 25 acres/flight
- Max weight: 7.7lbs
- Dimensions: 13.7 x 20.1 x 11.8 inches
- Max Range: 0.6 miles
- Area of coverage: 25 acres

9. ***3DRobotics Aero-M:***

- Flight area: 20 acres/flight
- Weight: 6.8 lbs
- Flight time: 40 minutes
- Dimensions: 74 x 51 inches
- Range: 1 km

10. **SenseFly eBee**

- Total weight with maximum allowable payload: 1.5lbs,
- Dimensions: Greatest width: 96cm (38in)
- Material: EPA foam, carbon structure & composite parts
- Maximum speed: 56mph
- Battery system (11.1 volt, 2150maH lithium-polymer) provides fifty (50) minutes of flight time
- Radio link range up to 3 km (1.86miles)

11. Trimble UX5

- Total weight with maximum allowable payload: 5.51lbs,
- Dimensions: Greatest width: 1 m (3.28 ft)
- Material: EPP foam, carbon structure & composite parts
- Maximum speed: 50mph
- Battery system (14.8 volt, 6000maH lithium-polymer) provides fifty (50) minutes of flight time
- Radio link range up to 3 km (3.10 miles)

12. Xactsense Titan:

- Flight time: 10-35 minutes
- Flight Area: 5 acres in 20 minutes
- Flight altitude: 180 feet
- Flying weight: 20-55 pounds
- Payload capacity: 55lbs
- Wingspan:7ft

13. Xactsense MAX-8:

- Flight time: 10-35 minutes
- Flight Area: 230 acres
- Flight altitude: 400 feet
- Flying weight: 6-41 pounds
- Payload capacity: 35lbs

14. Xactsense MapFly 6:

- Flight time: 10-60 minutes
- Flight Area: 470 acres
- Flight altitude: 400 feet
- Flying weight: 8-12 pounds
- Wingspan: 60", Length: 37.4"
- Payload capacity: 6lbs

The sUAS will operate only in the pilot's or visual observer's visual line of sight at all times. Such operations will insure that the sUAS will "not create a hazard to users of the national airspace system or the public." Reform Act Section 333(b).

Given the small size of the sUAS involved and the restricted environment within which they will operate, our application falls squarely within the zone of safety (an equivalent level of safety) in which Congress envisioned that the FAA must, by exemption, allow commercial operations of sUASs to commence immediately. Also due to the small size of the UAS and the low altitudes in which our sUAS will operate, approval of the application presents no national security issue.

The sUAS can be operated entirely by a touch-screen, map-based interface. This means the operator only needs to command the system where to go, and the system does all the flying for the operator. The sUAS can be operated in both semi and fully autonomous flight modes, with the operator simply clicking on a map to create a pre-planned flight path for a flight. In addition, the operator can create no fly zones or maximum flight ranges and altitudes so the system cannot enter areas deemed unsafe or unnecessary to fly over.

The sUAS has built-in intelligent fault handling which allows it to detect a system fault while in the air and automatically fly back to its take-off location and land. Faults that can be detected include: loss of communication; exceeding pre-set wind thresholds; and low battery levels.

All flight operations are global positioning system (GPS) controlled, making the system easy to navigate. At any point if the operator is not explicitly commanding the system to move, the system automatically holds its GPS position. The flight control system employs not only GPS positioning but a variety of sensors including sonar, barometric pressure, temperature, wind speed and others to ensure stability so long as wind thresholds are not exceeded. Also a flight termination link – to prevent a "fly away" or other potentially dangerous situation – is available to the operator.

DESCRIPTION OF SPECIFIC REGULATIONS

14 CFR Part 21, Subpart H: Airworthiness certificates

Subpart H, 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 Digital GIS, 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 USC §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. In all cases, an analysis of these criteria demonstrates that the sUAS 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 operating with an airworthiness certificate without the restrictions and conditions proposed.

14 CFR 45.23(b): Marking of the aircraft

This regulation requires that certain experimental, provisionally certified aircraft, or light-sport category aircraft to be marked with letters between 2 inches and 6 inches high "limited", "restricted," "light-sport," "experimental," or "provisional," near each entrance to a cabin, cockpit or pilot station.
Even though the UAS will have no airworthiness certificate, an exemption may be needed as the sUAS will have no entrance to the cabin, cockpit or pilot station on which the word "Experimental" can be placed. Given the size of the sUAS, 2 inch lettering will be impossible. Digital GIS will mark the sUAS with the organization's name and address. An insurance barcode attached to the aircraft will also be linked to Digital GIS.

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

Sections 61.113(a) and (b) limit private pilots to non-commercial operations. Because the sUAS will not carry a pilot or passengers, the proposed operations can achieve the equivalent level of safety of current operations by requiring the pilot operating the aircraft to have completed a UAS flight training course of 100 hours before flying a sUAS. Unlike a conventional aircraft that carries the pilot and passengers, the sUAS is remotely controlled with no living thing or cargo on board. The area of operation is controlled and restricted, and all flights are planned and coordinated in advance. The risks associated with the operation of the small UAS are so diminished from the level of risk associated with commercial operations contemplated by Part 61 when drafted, that allowing operations of the sUAS as requested exceeds the present level of safety achieved by 14 CFR 61.113(a) and (b).

14 CFR 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 and the requirements 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, marking and placard requirements

The sUAS, given its size and configuration has no ability or place to carry such a flight manual on the aircraft, not only because there is no pilot on board, but because there is no room or capacity to carry such an item on the aircraft.

The equivalent level of safety will be maintained by keeping the User Manual at the ground control point where the pilot flying the sUAS will have immediate access to it.

14 CFR 91.103: Preflight action

This regulation requires each pilot in command take certain actions before flight to ensure the safety of flight. An exemption is needed from this requirement as the pilot will take separate preflight actions, including checking for weather conditions, checking flight battery requirements, checking takeoff and landing distances, and all other actions in the safety checklists. These actions will provide an equivalent level of safety.

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.
By design, sUASs and remotely piloted aircraft 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 equivalent level of safety is provided by the fact that neither a pilot nor passengers will be carried in the aircraft, the ability to control the sUAS via radio signals from the controller and by the size and speed of the aircraft.

14 CFR 91.111(a): Operating near another aircraft

Section 91.111(a) establishes that no person may operate an aircraft so close to another aircraft as to create a collision hazard. Occasionally, sUAS engage in simultaneous flight routines that employ more than one (1) sUAS in a tightly controlled, patterned flight plan based on onboard GPS positioning navigation systems. This method of data collection employs interferometric capture sequences, requiring more than one measurement sensor during the flight routine.

14 CFR 91.119: Minimum safe altitudes

Section 91.119 establishes safe altitudes for operation of civil aircraft. Section 91.119(d) allows helicopters to be operated at less than the minimums prescribed, provided the person operating the helicopter complies with any route or altitudes prescribed for helicopters by the FAA. This exemption is for a multirotor craft that flies similarly to a helicopter, with vertical takeoff and vertical landing, which will typically operate at altitudes of 200 feet above ground level (AGL), so an exemption may be needed to allow such operations. The sUAS will never operate at altitude higher than 400 AGL and all operations will occur during daylight hours under Visual Meteorological Conditions (VMC) only.

The equivalent level of safety will be achieved given the size, weight and speed of the sUAS as well as the location where it is operated. No flight will be taken without the permission of the property owner or local officials. Because advance notice to the property owner and any onsite personnel, as well as the precautions outlined below, all affected individuals will be aware of the planned flight operations.

Flight operations will be conducted at least 500 feet from all non-participating persons (persons other than the pilot in command (PIC) or visual observer (VO)), vessels, vehicles and structures, unless:

Barriers or structures are present that sufficiently protect non-participating persons from debris in the event of an accident. The PIC will ensure that non-participating persons remain under such protection. If a situation arises where non-participating persons leave such protection and are within 500 feet of the sUAS, flight operations will cease immediately and/or;

The aircraft is operated near vessels, vehicles or structures where the land owner/controller has granted permission and the PIC has made a safety assessment of the risk of operating closer to those objects and;

Operations near the PIC or VO do not present an undue hazard to the PIC or VO, per 14 CFR 91.119(a).

The sUAS will remain within visual line of sight of the PIC or VO. Flight operations will be conducted at least 5 miles from an airport and at least 3 miles from any city or densely populated area. The PIC or VO will provide notification to the local Flight Standards District Office and airport controller of all operations within 5 miles of an airport. The FAA will have advance notice of all operations through the filing of notices-to-airmen.

Compared to flight operations with aircraft or rotorcraft weighing far more than the sUAS proposed herein and carrying flammable fuel, any risk associated with our operations is far less than those presently presented with helicopters and other conventional aircraft operating at or below 500 feet AGL. In addition, the low-altitude operations of the sUAS will ensure separation between these UAS operations and the operations of conventional aircraft that must comply with Section 91.119.

14 CFR 91.121: Altimeter Settings

This regulation requires each person operating the aircraft to maintain cruising altitude by reference to an altimeter that is set "…to the elevation of the departure airport or an appropriate altimeter setting available before departure." As the sUAS may not have a barometric altimeter, but instead a GPS altitude read out, an exemption may be needed. An equivalent level of safety will be achieved by the PIC confirming the altitude of the launch site shown on the GPS altitude indicator before flight.

14 CFR 91.151(a): Fuel requirements for flight in VFR conditions

Section 91.151(a) outlines fuel requirements for beginning a flight in VFR conditions. Our sUAS is limited to operations in controlled environments and has a limited flight time which require an exemption from 14 CFR 91.151(a).

The battery powering the sUAS provides approximately 25 minutes of powered flight. This would render the sUAS unable to meet the 30 minute reserve requirement in 14 CFR 91.151. Given the limitations on the sUAS's proposed flight area and the location of its proposed operations within a predetermined area, a longer time frame for flight in daylight VFR conditions is reasonable.

An equivalent level of safety can be achieved by limiting flights to 20 minutes, or enough battery reserve to ensure that the sUAS lands at the ground station with at least 20% of battery power (as determined by the onboard monitoring system and the PIC), 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.

14 CFR 91.203(a) & (b): Carrying civil aircraft certification and registration

The sUAS has no cabin, cockpit or pilot station and is operated without an onboard pilot. Therefore, there is no ability or place to carry certification and registration documents or to display them on the sUAS.

An equivalent level of safety will be achieved by keeping these documents at the ground control point where the pilot flying the sUAS will have immediate access to them, to the extent they are applicable to the sUAS.

14 CFR 91.405(a); 407(a)(1); 409(a)(2); 417(a) & (b): Maintenance inspections

These regulations require that an aircraft operator or owner "shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter…," and others shall inspect or maintain the aircraft in compliance with Part 43.

Given that these sections and Part 43 apply only to aircraft with an airworthiness certificate, these sections will not apply to Unmanned Experts. Maintenance will be accomplished by the operator pursuant to the manufacturer's recommendations. An equivalent level of safety will be achieved because these sUASs 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 sUAS can land immediately and will be operating from no higher than 400 feet AGL. The operator will ensure that the sUAS 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.

PUBLIC INTEREST

Approval of exemptions allowing commercial operations of sUASs for precision aerial surveys enhances safety while reducing risk. Manned aircraft monitoring and surveying creates a greater risk because the craft are much larger, have combustible fuel, and carry an onboard human pilot. In contrast, a sUAS weighing 5 pounds and powered by batteries eliminates virtually all of that risk given the reduced mass and lack of combustible fuel carried on board. The sUAS will carry no passengers or crew and, therefore, will not expose them to the risks associated with manned aircraft flights.

Conducting aerial surveys with the sUAS, instead of manned aircraft, will greatly benefit the public by drastically reducing the levels of air and noise pollution generated during traditional aerial survey flight operations. By using battery power and electric motors, the sUAS produces no air pollution and is a viable, environmentally conscious alternative to the cabin class, six cylinder internal combustion twin engine aircraft that are typically utilized for aerial surveys, while burning approximately 20-30 gallons per hour of leaded aviation fuel. The sUAS, while reducing the carbon footprint of aerial surveys, also reduces noise pollution as it is propelled by battery powered electric motors rather than an internal combustion engine.

EQUIVALENT LEVEL OF SAFETY

Unmanned Experts proposes that the exemption requested herein apply to civil aircraft that have the characteristics and that operate within the limitations listed herein. These limitations provide for at least an equivalent or even higher level of safety to operations under the current regulatory structure because the proposed operations represent a safety enhancement to the already safe protocols followed by aerial survey operations conducted with helicopters and other conventional aircraft. Unmanned Experts will be bound by the following limitations when conducting its sUAS operations under an FAA issued exemption:

1. The sUAS will weigh less than 55 pounds.
2. Flights will be operated within line of sight of a pilot and/or observer.
3. Maximum total flight time for each operational flight will be 20 minutes. Flights will be terminated at 20% battery power reserve should that occur prior to the 20 minute limit.
4. Flights will be operated at an altitude of no more than 400 feet AGL.
5. Flight operations will be conducted 5 miles from an airport and at least 3 miles from any city or densely populated area, which are depicted in yellow on VFR sectional charts.
6. Flight operations within 5 miles of an airport require notification and approval from the local Flight Standards District Office and airport controller.
7. Flight operations will occur during daylight hours and under visual meteorological conditions only.
8. The FAA will have advance notice of all operations through the filing of notices-to-airmen.
9. Minimum crew for each operation will consist of the sUAS pilot and visual observer.
10. The sUAS pilot will be an FAA licensed airman with at least a private pilot's certificate and third class medical.
11. The pilot and visual observer will have been trained in the operation of the sUAS.
12. The pilot and visual observer will at all times be able to communicate by voice and/or text.

13. Written and/or oral permission from the relevant property holders will be obtained.
14. Flight operations will be conducted at least 500 feet from all non-participating persons, vessels, vehicles and structures unless:
    a. Barriers or structures are present that sufficiently protect non-participating persons from debris in the event of an accident. The pilot will ensure that non-participating persons remain under such protection. If a situation arises where non-participating persons leave such protection and are within 500 feet of the sUAS, flight operations will cease immediately and/or;
    b. The aircraft is operated near vessels, vehicles or structures where the land owner/controller has granted permission and the PIC has made a safety assessment of the risk of operating closer to those objects and;
    c. Operations near the pilot or visual observer do not present an undue hazard to the pilot or visual observer.
15. If the sUAS loses communication or loses its GPS signal, the sUAS will have the capability to return to a safe, pre-determined location and land.
16. The sUAS will have the capability to abort flight in case of unpredicted obstacles or emergencies.

PRIVACY

All flights will occur over private or controlled access property with the property owner's prior consent and knowledge. Images taken will be of individuals who have also consented to being filmed or otherwise have agreed to be in the area where aerial photography will take place.

FEDERAL REGISTER SUMMARY

Mr. Edward Roske, Aerial Photogrammetrist and Mapping Specialist, Digital GIS, 1164 Sedgewood Circle, West Melbourne, Florida 32904, petitioned the FAA on behalf of Digital GIS for an exemption from part 21 and §§ 45.23(b), 61.113(a) and (b), 91.7(a), 91.9(b)(2), 91.103, 91.109, 91.111(a), 91.119, 91.121, 91.151(a), 91.203(a) and (b), 91.405(a), 407(a)(1), 409(a)(2), 417(a) and (b) of Title 14, Code of the Federal Regulations (14 CFR). The exemption would allow commercial operation of small Unmanned Aircraft Systems (sUASs) for precision aerial surveys, inspection, photography, and cinematography.
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Satisfaction of the criteria provided in Section 333 of the Reform Act of 2012 – size, weight, speed, operating capabilities, proximity to airports and populated areas and operation within visual line of sight and national security – provide more than adequate justification for the grant of the requested exemptions allowing commercial operation of Digital GIS' sUAS for *precision aerial surveys, inspection, photography, and cinematography.*

Sincerely,
Edward Roske
Digital GIS, LLC
Aerial Photogrammetrist and Mapping Specialist