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DEPARTMENT OF  
TRANSPORTATION  
DOCKET OPERATIONS  
2014 DEC 23 P 1:57

December 11, 2014

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

**RE: Exemption Request – Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations from 14 C.F.R. 45.23(b); 14 CFR Part 21; 14 CFR 61.113 (a) & (b); 91.7 (a); 91.9 (b) (2); 91.103(b); 91.109; 91.119; 91.121; 91.151(a); 91.203(a) & (b); 91.405 (a); 91.407(a) (1); 91.409 (a) (1) & (2); 91.417 (a) & (b).**

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95, 126 Stat. 11 (amending 49 U.S.C.) (hereinafter, the “**Reform Act**”) and 14 C.F.R. Part 11, Surveying And Mapping, LLC (“**SAM**”), developer and operator of small unmanned aircraft systems (singularly a “**sUAS**” or cumulatively “**sUASs**”) equipped to conduct professional aerial land surveying and geospatial services, hereby applies for an exemption from the listed Federal Aviation Regulations (“**FARs**”) to allow commercial operation of its sUASs, so long as such operations are conducted within and under the conditions outlined herein or as may be established by the FAA as required by Section 333 of the Reform Act.

As described more fully below, the requested exemption would permit the operation of small, unmanned sUAS under controlled conditions in airspace that (i) is limited, (ii) is predetermined, (iii) is controlled as to access, and (iv) would provide safety enhancements to the already safe operations in the mapping and surveying industry presently using conventional aircraft. 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.” *Reform Act* § 333 (c).

The name and address of the applicant (“**Applicant**”) is:

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The Applicant hereby requests exemption from the following FARs:

14 CFR Part 21  
14 C.F.R. 45.23(b)  
14 CFR 61.113 (a) & (b)  
14 C.F.R. 91.7 (a)  
14 CFR 91.9 (b) (2)  
14 C.F.R. 91.103  
14 C.F.R. 91.109  
14 C.F. R. 91.119  
14 C.F.R. 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) (1) & (2)  
14 CFR 417 (a) & (b)

This exemption application is expressly submitted to fulfill Congress' goal in passing Section 333(a) through (c) of the Reform Act. This law directs the Secretary of Transportation to consider whether certain unmanned aircraft systems ("UAS") may operate safely in the national airspace system ("NAS") before completion of the rulemaking required under Section 332 of the Reform Act. In making this determination, the Secretary of Transportation is required to determine which types of unmanned aircraft systems do not create a hazard to users of the NAS or the public or pose a threat to national security in light of (i) the UAS's size, weight, speed, and operational capability, (ii) operation of the UAS in close proximity to airports and populated areas, and (iii) operation of the UAS within visual line of sight of the operator. *Id.* § 333 (b) (1). Lastly, if the Secretary of Transportation determines that such vehicles "may operate safely in the national airspace system, the Secretary of Transportation shall establish requirements for the safe operation of such aircraft in the national airspace system." *Id.* § 333 (c) (underline added).<sup>1</sup>

The Federal Aviation Act, 49 U.S.C. (the "Act") expressly grants the FAA the authority to issue exemptions. This statutory authority by its terms includes exempting "civil aircraft," as the term is defined under §40102 of the Act that includes sUASs from the requirement that all civil aircraft must have a current airworthiness certificate.

The FAA Administrator may grant an exemption from a requirement of a regulation prescribed under the Act if the Administrator finds the exemption in the public interest. 49 U.S.C. § 44701 (f). *See also* 49 USC § 44711 (a); 49 USC § 44704; 14 CFR § 91.203 (a) (1).

SAM's sUASs are rotorcraft, weighing 55 or fewer lbs. including payload. They will operate, under normal conditions, at a speed of no more than 50 knots and SAM will not operate their sUAS in known or forecast winds greater than 35 knots. They will operate only in line of sight and will operate only within the airspace above property owned, leased, or otherwise controlled by SAM or its customers with permission from said customers prior to any operation of sUAS as

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<sup>1</sup> The Applicant interprets this provision to place the duty on the Administrator to not only process applications for exemptions under Section 333 of the Reform Act, but for the Administrator to craft conditions for the safe operation of the UAS, if it should be determined that the conditions set forth herein do not fulfill the statutory requirements for approval.



described in the Safety Checklist, attached as Exhibit A (hereinafter, the **Safety Checklist**)<sup>2</sup>. Such operations will ensure that the sUASs will, “not create a hazard to users of the national airspace system or the public.” *Reform Act* § 333 (b).

Given the small size of the sUASs involved and the non-public environments within which they will operate, the Applicant falls squarely within that zone of safety (an equivalent level of safety) in which Congress envisioned that the FAA must, by exemption, allow commercial operations of UASs to commence immediately. Also due to the size of the sUASs and the restricted areas in which the relevant sUASs will operate, approval of the application presents no national security issue. Given the clear direction in Section 333 of the Reform Act, the authority contained in the Act, as amended; the strong equivalent level of safety surrounding the proposed operations, and the significant public benefit, including enhanced safety, reduction in environmental impacts, including reduced emissions associated with allowing UAS for surveying and mapping operations, the grant of the requested exemption is in the public interest. Accordingly, the Applicant respectfully requests that the FAA grant the requested exemption without delay.

The Applicant proposes that the exemption requested herein apply to civil aircraft that have the characteristics and that operate with 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 mapping and surveying operations conducted with conventional aircraft.

These limitations and conditions to which SAM agrees to be bound when conducting commercial operations under an FAA issued exemption include:

1. Each sUAS will weigh less than 55 lbs.
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 determinate on battery capacity. Current battery technology for the sUAS allows for a 20 minute operations. Should battery technology increase operational flight times, flights will be terminated at 20% battery power reserve. Future battery technology will likely increase operational flight times, and as such, the maximum flight time will continue to increase. However, in any event, all operational flights will be terminated at 20% of capacity remaining.
4. Flights will be operated at an altitude of no more than 400 feet AGL unless prior approval from Air Traffic Control is authorized and a Notice to Airmen (NOTAM) is filed and published.
5. Minimum crew for each operation will consist of the sUAS pilot and a visual observer.
6. The sUAS pilot will be an FAA licensed airman with at least a private pilot's certificate and Class II airman medical certificate. The observer will hold at least a Class II airman medical certificate.

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<sup>2</sup> **Applicant submits this Safety Checklist as a confidential document under 14 C.F.R. 11.35 (b) as the entire safety checklist contains proprietary information that the Applicant has not and will not share with others. The safety checklist contains operating conditions and procedures that are not available to the public and are protected from release under the Freedom of Information Act, 5 U.S.C. 552 et seq.**



7. The sUAS pilot will be Pilot in Command (“**PIC**”). If a pilot certificate holder other than the sUAS pilot, who possesses the necessary PIC qualifications, is also present during operations that person can also be designated as PIC.
8. The sUASs will only operate over property owned by, leased or otherwise controlled by SAM with permission from the relevant property holders and not over publicly occupied property as set forth in the Safety Checklist.
9. A briefing between the sUAS pilot and observer will be conducted in regard to the planned sUAS operations prior to each day’s operations.
10. The Applicant will file a FAA Form 7711-1, or its equivalent, as modified in light of the requested exemption, with the appropriate Flight Standards District Office (“**FSDO**”).
11. The Applicant will submit a written Plan of Activities to the FSDO three days before the proposed operations as required in Safety Checklist.
12. The sUAS pilot and observer will have been trained in operation of sUASs generally and received up-to-date information on the particular sUAS to be operated as required in Safety Checklist.
13. The sUAS pilot and observer will at all times be able to communicate by voice and/or text.
14. Written and/or oral permission from the relevant property holders will be obtained.
15. All required permissions and permits will be obtained from territorial, state, county or city jurisdictions, including local law enforcement, fire, or other appropriate governmental agencies.
16. If the sUASs lose communications or lose their GPS signal, the sUASs will have capability to return to and land at a pre-determined and pre-programmed location.
17. The sUASs will have the capability to abort a flight in case of unpredicted obstacles or emergencies.

**I. 14 C.F.R. Part 21, Subpart H: Airworthiness Certificates 14 C.F.R. §91.203 (a) (1)**

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. Section 44701 (f) of the Act and Section 333 of the Reform Act both authorize the FAA to exempt aircraft from the requirement for an airworthiness certificate upon consideration of the size, weight, speed, operational capability, and proximity to airports and populated areas of the particular sUAS. In all cases, an analysis of these criteria demonstrates that the sUASs operated without an airworthiness certificate, in the restricted environment and under the conditions proposed herein 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.



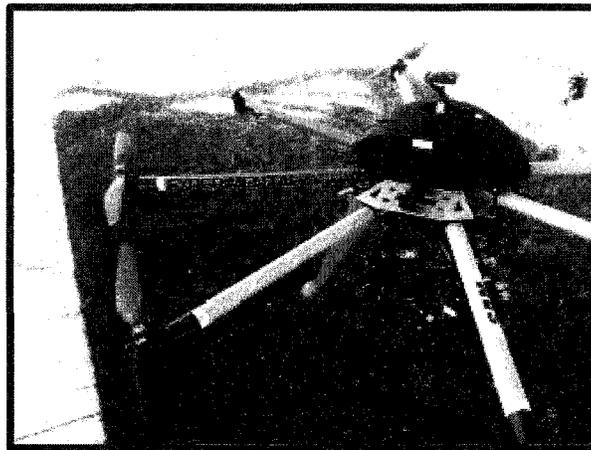
The sUASs to be operated hereunder are less than 55 lbs. fully loaded, carries neither a pilot nor passenger, carries no explosive materials or flammable liquid fuels, and operates exclusively within a secured area as set out in the Safety Checklist. Unlike other civil aircraft, operations under this exemption will be tightly controlled and monitored by the Applicant pursuant to the Safety Checklist's requirements, and under the requirements and in compliance with local public safety requirements, to provide security for the area of operation as is now done with conventional aerial mapping and surveying. The FAA will have advance notice of all operations. These safety enhancements, which already apply to civil aircraft operated in connection with mapping and surveying operations, 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, 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.

## II. 14 C.F.R. § 45.23 (b). Marking of the Aircraft

This regulation requires:

“When marks include only the Roman capital letter "N" and the registration number is displayed on limited, restricted or light-sport category aircraft or experimental or provisionally certificated aircraft, the operator must also display on that aircraft near each entrance to the cabin, cockpit, or pilot station, in letters not less than 2 inches nor more than 6 inches high, the words "limited," "restricted," "light-sport," "experimental," or "provisional," as applicable.”

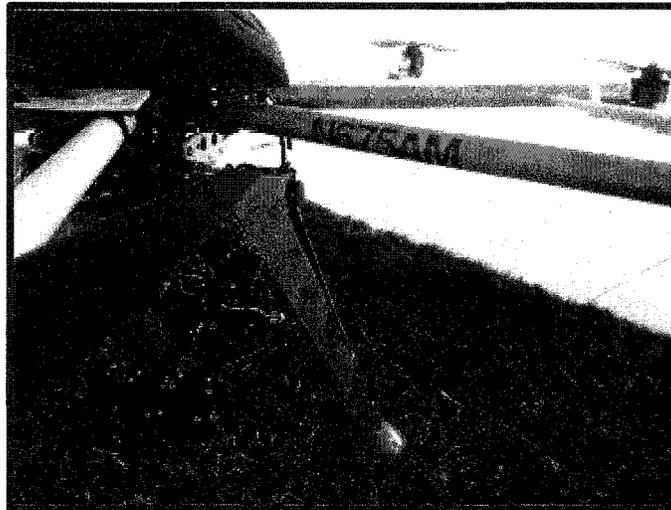
Even though the sUASs will have no airworthiness certificate, an exemption may be needed as the sUASs will have no entrance to the cabin, cockpit or pilot station on which the word “Experimental” can be placed. Given the size of the sUASs, two-inch lettering will be impossible. The word “Experimental” will be placed in a visible location on the sUASs as pictured in the example below.



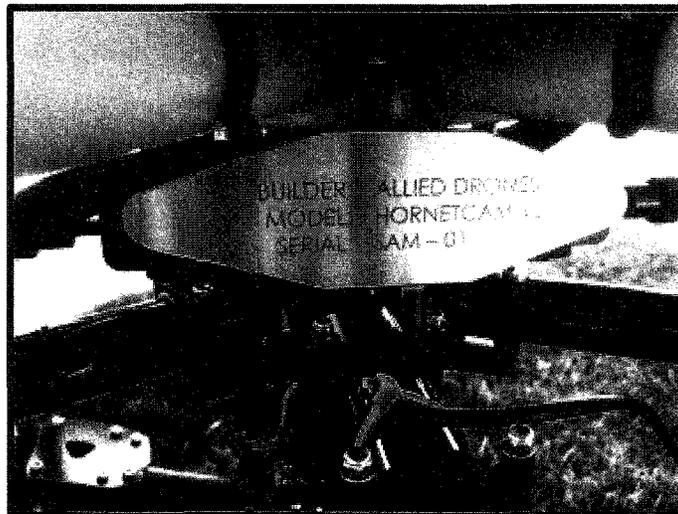


The equivalent level of safety will be provided by having each sUAS marked in the visible location where the sUAS pilot, observer and others working with the sUAS will see the identification of the UAS as “Experimental.” The FAA has issued the following exemptions to this regulation in Exemptions Nos. 10700, 8738, 10167 and 10167A.

In addition, the Applicant shall also ensure its sUASs are registered with the FAA and that the nationality marks relating to such sUASs are marked on the sUASs in a visible manner as pictured in the example below.



Finally, the Applicant shall also ensure its sUASs have a fireproof aircraft data plate located on the sUASs which shall be visible on the ground and does not require the dismantlement of the sUASs to be legible in a similar fashion as pictured in the example below.



**III. 14 C.F.R. § 61.113 (a) & (b): Private Pilot Privileges and Limitations: Pilot in Command**



Sections 61.113 (a) & (b) limit private pilots to non-commercial operations. Because the sUASs will not carry a pilot or passengers, the proposed operations can achieve the equivalent level of safety of current operations by requiring the PICs operating the sUASs to have a private pilot's license rather than a commercial pilot's license to operate this sUASs. Unlike a conventional aircraft that carries the pilot and passengers, the sUASs are remotely-controlled with no living thing on board. The area of operation is controlled and restricted, and all flights are planned and coordinated in advance as set forth in the Safety Checklist. The level of safety provided by the requirements included in the Safety Checklist exceeds that provided by a single individual holding a commercial pilot's certificate operating a conventional aircraft. The risks associated with the operation of the sUASs are so diminished from the level of risk associated with commercial operations contemplated by Part 61 when drafted, that allowing operations of the sUASs as requested with a private pilot as the PIC exceeds the present level of safety achieved by 14 C.F.R. §61.113 (a) & (b).

#### **IV. 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 and the requirements contained in the Safety Checklist for maintenance and use of the Safety Checklist prior to each flight, an equivalent level of safety will be provided.

#### **V. 14 C.F.R. § 91.9 (b) (2): Civil Aircraft Flight Manual in the Aircraft**

Section 91.9 (b) (2) provides:

“No person may operate a U.S.-registered civil aircraft ...

(2) For which an Airplane or Rotorcraft Flight Manual is not required by §21.5 of this chapter, unless there is available in the aircraft a current approved airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof.”

The sUASs, given their size and configuration have 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 sUASs.

The equivalent level of safety will be maintained by keeping the flight manual at the ground control point to which the sUASs pilots flying the sUASs will have immediate access. The FAA has issued the following exemptions to this regulation: Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 9565B, 10167, 10167A, 10602, 32827, and 10700.

#### **VI. 14 C.F.R. § 91.103: Preflight action**

This regulation requires each pilot in command to take certain actions before flight to insure the safety of flight. As FAA-approved rotorcraft flight manuals will not be provided for the aircraft



an exemption will be needed. An equivalent level of safety will be provided as set forth in the Safety Checklist. The PIC will take all actions including reviewing weather, flight battery requirements, landing and takeoff distances and aircraft performance data before initiation of flight.

#### **VII. 14 C.F.R. § 91.109: Flight instruction**

Section 91.109 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.

sUASs 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 is 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.

#### **VIII. 14 C.F.R. § 91.119: Minimum safe altitudes**

Section 91.119 establishes safe altitudes for operation of civil aircraft. Section 91.119(d) allows helicopters, powered parachutes and weight-shift-control aircraft to be operated at less than the minimums prescribed because their low speed and responsive controls allow operations to be conducted, "without hazard to persons or property on the surface ...". As sUAS possess similar flight and control characteristics, and as the exemption requests authority to operate at altitudes up to 400 AGL, an exemption may be needed to allow such operations. As set forth herein, except for the limited conditions stated in the Safety Checklist, the sUASs will never operate at higher than 400 AGL. It will however be operated in a restricted area, where buildings and people will not be exposed to operations without their pre-obtained consent.

The equivalent level of safety will be achieved given the size, weight, speed of the sUASs as well as the locations where they are operated. No flight will be taken without the permission of the property owner or local officials. Because of the advance notice to the property owner, all affected individuals will be aware of the planned flight operations as set forth in the Safety Checklist. Compared to flight operations with aircraft or rotorcraft weighting far more than the maximum 55lbs. proposed herein and the lack of flammable fuel, any risk associated with these operations is far less than those presently presented with conventional aircraft operating at or below 500 AGL in the mapping and surveying industry. In addition, the low-altitude operations of the sUASs will ensure separation between these sUAS operations and the operations of conventional aircraft that must comply with Section 91.119.

#### **IX. 14 C.F.R. § 91.121 Altimeter Settings**

This regulation requires each person operating an aircraft to maintain cruising altitude by reference to an altimeter that is set "... to the elevation of the departure airport or an appropriate altimeter setting available before departure." As the sUASs 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 operator, pursuant to the Safety Checklist, confirming the altitude of the launch site shown on the GPS altitude indicator before flight.

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

Section 91.151 (a) prohibits an individual from beginning “a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing, and, assuming normal cruising speed – (1) During the day, to fly after that for at least 30 minutes; or (2) At night, to fly after that for at least 45 minutes.”

The current battery technology powering sUASs is much more limited than that of combustion powered flight. As such, the Applicant’s sUASs can not presently and likely may never will meet the reserve requirement in 14 CFR § 91.151. 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 VFR conditions is reasonable. As no night flight will occur, that portion is inapplicable.

Applicant 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 sUASs 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, speed and limited operating area of the sUASs.

Applicant believes that an equivalent level of safety can be achieved by limiting flights based on expected battery life, currently 20 minutes, or 20% of battery power when future technology expands the battery life . This restriction would be more than adequate to return the sUASs to their 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.

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

The regulation provides in pertinent part:

“(a) Except as provided in § 91.715, no person may operate a civil aircraft unless it has within it the following:

(1) An appropriate and current airworthiness certificate...

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

The sUASs fully loaded weigh no more than 55 lbs. and are operated without an onboard pilot. As such, there is no ability or place to carry certification and registration documents, or to display them on the sUASs.



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

**XII. 14 C.F.R. § 91.405 (a); 407 (a) (1); 409 (a) (1) & (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 the sUASs as proposed to be operated by the Applicant. Maintenance will be accomplished by the Applicant pursuant to the flight manual and operating handbook as referenced in the Safety Checklist. 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 sUASs can land immediately and will be operating from no higher than 400 feet AGL. As provided for in the Safety Checklist, the Applicant 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 Applicant is person most familiar with the aircraft and best suited to maintain the aircraft in an airworthy condition to provide the equivalent level of safety.

**SUMMARY**

Pursuant to 14 C.F.R. Part 11, the following summary is provided for publication in the Federal Register, should it be determined that publication is needed:

Applicant seeks an exemption from the following rules:

14 C.F.R. § 21, subpart H; 14 C.F.R. 45.23 (b); 14 C.F.R. §§ 61.113 (a) & (b); 91.7 (a); 91.9 (b) (2); 91.103 (b); 91.109; 91.119; 91.121; 91.151 (a); 91.203 (a) and (b); 91.405 (a); 91.407 (a) (1); 91.409 (a) (2); 91.409 (a) (1) & (2) and 91.417 (a) & (b) to operate commercially small unmanned aircraft systems (55 lbs. or less) in mapping and surveying operations.

Approval of exemptions allowing commercial operations of sUASs in the mapping and surveying industry will enhance safety by reducing risk. Conventional mapping and surveying operations, using jet or piston power aircraft, operate at extremely low altitudes and in extreme proximity to people and structures; and present the risks associated with vehicles that weigh in the neighborhood of 4,000 lbs., carrying large amounts of jet A or other fuel. Such aircraft must fly to and from the mapping or surveying location. In contrast, a sUASs weighing fewer than 55 lbs. and powered by batteries eliminates virtually all of that risk given the reduced mass and lack of combustible fuel carried on board. The sUASs are carried to the mapping or surveying site



and not flown. The sUASs will carry no passengers or crew and, therefore, cannot and will not expose them to the risks associated with manned aircraft flights.

The operation of sUASs, weighing less than 55 lbs., conducted in the strict conditions outlined above, will provide an equivalent level of safety supporting the grant of the exemptions requested herein, including exempting the Applicant from the requirements of Part 21 and allowing commercial operations. These lightweight aircraft operate at slow speeds, close to the ground, and in a sterile environment and, as a result, are far safer than conventional operations conducted with turbine helicopters or other manned aircraft operating in close proximity to the ground and people.

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Satisfaction of the criteria provided in Section 333 of the Reform Act – 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 Applicant’s sUASs in the mapping and surveying industry pursuant to the Safety Checklist appended hereto.

Very truly yours,

PATRICK A. SMITH  
Printed      ASSOCIATE