MSPhotography
Professional Photographic and Media Services

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33 Sea Ave, Quincy, MA

Docket Management System
U.S. Dept. of Transportation
1200 New Jersey Ave., SE
Washington, D.C. 20590

MSPhotography, December 31, 2014

Re: Exemption Request Pursuant To Section 333 of the FAA Reform Act of 2012

Dear Sir or Madam,

Pursuant to §333 of the FAA Modernization and Reform Act of 2012 (the Reform Act) and 14 C.F.R. Part 11, MSPhotography DBA MSAerial, operator of Small Unmanned Aircraft Systems (sUASs) equipped to conduct aerial photography for the media and advertising indestries for pre-planned, controlled area, photographic and surveying 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 Federal Aviation Administration (FAA) as required by §333. MSAerial's current operation of sUASs for commercial purposes has been halted to comply with recently enacted federal aviation regulations pertaining to sUASs.

As described more fully below, the requested exemption would permit the operation of small, unmanned and relatively inexpensive multirotor aircraft under controlled conditions in airspace that is 1) contained 2) predetermined 3) has on-site safety personnel controlling access, and 4) would provide increased safety and enhancements to clients' business operations.

The name and address of the applicant is: MSPhotography dba MSAerial Attn:Melinda Sokoloski Ph:+1-(857)-204-2448 Email:mindi@msaerial.com Address: 33 Sea Ave, Quincy, MA 02169

MSAerial respectfully requests a grant of an exemption of the following sections of Title 14 of the Code of Federal Regulations:

- 14 CFR 21;
- 14 CFR 91, et seq.;
- 14 CFR 45.23 (b);

- 14 CFR 61.113 (a) & (b);
- 14 CFR 407 (a)(1);
- 14 CFR 409 (a)(2);
- 14 CFR 417 (a) & (b).

MSAerial also respectfully requests an Exemption from Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations from:

- 14 CFR 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) (2);
- 91.417 (a) & (b).

I. The Extent of Relief MSAerial Seeks and the Reason It Seeks Such Relief:

MSAerial submits this application in accordance with the Reform Act, 112 P.L. 95 §§331-334, seeking relief from any currently applicable federal aviation regulations FARs pertaining to UASs (unmanned aircraft systems) and operating to prevent MSAerial contemplated commercial photographic, mapping, and other flight operations within the U.S. national airspace system.

The Reform Act in §332 provides for such integration of civil UASs into our national airspace system as it is in the public's interest to do so. MSAerial's lightweight UASs meet the definition of "small unmanned aircraft" as set forth in §331 and combined with a sterling safety record in similar industries, MSAerial's light duty UASs are ideal recipients of exemption by the intent of the Reform Act.

Considerations for relief include a combination of sUAS physical characteristics, safety features, and safe practices identiied in §333:

- sUAS weight,
- sUAS overall size,
- sUAS speed over ground,
- sUAS flight zone characteristecs,
  - Non-operation near airports (civilian or military),
  - Tightly controlled operation in populated areas,

- Operation of the UAS by VLOS.
- Coordination by a minimum of 4 persons, three staff members of MSAerial and one safety official from the client.

Specific consideration is outline below.

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 sUASs, an exemption from Part 21 Subpart H meets the requirements of an equivalent level of safety under Part 11 and §333 of the Reform Act. The Federal Aviation Act (49 U.S.C.§44701 (f)) and §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 UAS operated without an airworthiness certificate, in the restricted environment and under the conditions proposed will be at least as safe, or safer, than a conventional aircraft (fixed wing or rotorcraft) operating with an airworthiness certificate without the restrictions and conditions proposed.

The sUAS to be operated by MSAerial is less than 11kg. with maximal payload consisting of remote sensing instrumentation, carries neither no persons, carries no explosive or flammable materials including combustible fuels, and operates exclusively within a secured area. Unlike other civil aircraft, operations under this exemption will be tightly controlled and monitored by both the pilot (PIC), 'spotter' role designated to act as both the remote sensing controller and secondary monitor for safety issues, and a technician, which assists in matters related to maintaining the sUAS and also monitors for safety concerns and liasons to the on-site safety officials. These enhancements to current safety practices and regulations, which already apply to civil aircraft, provide a greater degree of safety to the public and property owners than conventional aircraft 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 intrinsic credible threat to national security posed by the UAS, due to its size, speed of operation, location of operation, lack of intrinsic explosive materials or flammable liquid fuels, and inability to carry a substantial external load.

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

The 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 sUAS 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, two-inch lettering will be impossible. The word "Experimental" will be placed on the frame in compliance with §45.29 (f) at a size suitable for the available space.

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

Further markings include the use of flashing green LED illumination on the underside of the sUAS frame which stands at contrast against a blue or white sky.

14 C.F.R. §61.113 (a) & (b): Private Pilot Privileges and Limitations: Pilot in Command.
§61.113 (a) & (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 a ground crew member to have a private pilot's license rather than a commercial pilot's license to operate this sUAS. Unlike a conventional aircraft that carries the pilot and passengers, the sUAS is remotely controlled with no persons 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 sUAS are so diminished from the level of risk associated with commercial operations contemplated by Part 61 when drafted, that allowing operations as requested with a private pilot in the ground crew exceeds the present level of safety achieved by 14 C.F.R. §61.113 (a) & (b).

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 Manual for maintenance and use of safety check lists prior to each flight, a subset of which are provided in enclosed Supplemental material, an equivalent level of safety will be provided.

14 C.F.R. §91.9 (b) (2): Civil Aircraft Flight Manual in the Aircraft.
§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 sUAS, given its size and configuration has no ability to carry a physical flight manual on the aircraft. The equivalent level of safety will be maintained by keeping the flight manual at the ground control point where the pilot flying the sUAS will have immediate access to it. 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.

14 C.F.R. §91.103: Preflight action
This regulation requires each PIC 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. The PIC will take all actions including reviewing weather, flight battery requirements, landing and takeoff distances and aircraft performance data before initiation of flight. Further, we have proprietary manuals created with the help of sUAS experts, the manufacturer, the regional sUAS vendor and policy holding insurer and continue to work with these organizations to ensure best safe practices are adhered to.

14 C.F.R. §91.109: Flight instruction
§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. 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 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. Enhancing this safety is the technology inherent in the remote controls utiziling digital communications which is paired to the sUAS making it nearly impossible to unintentionally or intentionally have the control communications interrupted.

14 C.F.R. §91.119: Minimum safe altitudes

§91.119 establishes safe altitudes for operation of civil aircraft. §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. As this exemption is for a sUAS that closely mimics the behavior of a helicopter, and 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, the UAS will never operate at higher than 400 AGL or beyond unaided visual line of sight, whichever is closer. It will however be operated in a restricted area with security officials tasked with ensuring public safety, and where buildings and people will not be exposed to operations without their pre-obtained consent and training.

The equivalent level of safety will be achieved given the size, weight, speed of the UAS as well as the location where it is operated. No flight operation will be taken without the permission of the property owner in the case of private property or local officials i the case of public property or private property with public interests. Because of the advance notice to the property owner and participants in the remote sensing activity, all affected individuals will be aware of the planned flight operations. Compared to flight operations with aircraft or rotorcraft weighting far more than the maximum 11kg of MSAerial's sUASs 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 addition, the low-altitude operations of the sUAS will ensure separation between these small- UAS operations and the operations of conventional aircraft that must comply with §91.119.

14 C.F.R. §91.121 Altimeter Settings

§91.121 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 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 operator, confirming the altitude of the launch site shown on the GPS altitude indicator before flight. The PIC and Technician will also ensure effective pairing with multiple GPS sources to guarantee accurate detection of height.

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

§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 15 minutes of powered flight in hover mode with out payload. MSAerial's sUAS will not be able to meet the 30 minute reserve requirement in 14 CFR §91.151. 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 power, 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. MSAerial believes that an equivalent level of safety can be achieved by limiting flights to $\gg$ 10 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 C.F.R. §91.203 (a) & (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 sUAS fully loaded weighs no more than 11kg and is 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 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. The FAA has issued numerous exemptions to this regulation. A representative sample of other exceptions includes Exemption Nos. 9565, 9665, 9789, 9789A, 9797, 9797A, 9816A, and 10700.

14 C.F.R. §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 section and Part 43 apply only to aircraft with an airworthiness certificate, these sections will not apply to the applicant. Maintenance will be accomplished by the operator pursuant to the flight manual. 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. 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.

An exemption granted to MSAerial would permit its operation of lightweight, unmanned, remotely controlled, sUASs in a tightly controlled environment with limited airspace. MSAerial utilizes local business' safety officers in specifically determined areas (designed flight zone) to mitigate injury and property damage while fulfilling clients' goals. Technical enhancements to current safety controls will allow MSAerial to operate exceeding current safety specifications, and stay ahead of, or meet, new ones being implemented by the FAA and Department of Transportation. Further, MSAerial conducts its operations in compliance with protocols described herein or as otherwise established by the FAA.

II. Commercial and Public Benefits

We at MSAerial believe that granting this exemption request furthers the public interest by providing safe (by way of an unmanned system) and efficient means to meet technical problems solvable by elevated data collection instruments. MSAerial's client base are typically small to medium sized business' looking to increase their awareness of structures or landscape on their respective properties through data collection

by photographic, videographic or lidar based surveying. By moving these functions onto sUAS based aircraft, the potential for loss of life or property is diminished due to the greater control in a smaller and safer aircraft that holds no persons. Second, there are no reactive or combustible materials on board the sUAS and thus the potential for fire or explosions is greatly diminished. Third, the small size and extreme maneuverability of MSAerials UASs allow the PIC to avoid hazards. Lastly, due to the nature of the remote sensing instrumentation onboard, the sUAS can maintain quite a safe distance between the aircraft and the object(s) undergoing scrutiny. Accordingly, MSAerial's UASs have operated and will continue to operate at and above current safety levels.

A. The costs and benefits of your proposed action to society in general and specific groups within society

As described above, MSAerial's past customers have been small to medium business seeking a remote sensing solution to specific issues before a larger effort on their part would come underway. Examples include construction efforts that sought elevated photographic imagery of specific landforms to minimize cost of efforts to develop, a regional park service that wanted to quantify the changing lifecycle of it's flora by way of measuring leaf health through gradual chlorophyll depletion, and a local cities' Dept. of Public Works that sought to collect images and 3D structural data by way of Lidar sensing *en masse* of it's bridges to serve as a supplement to it's routine repair and planning documentation.

The impact to society, financial and otherwise, would be extremely minimal. Indeed, it's been demonstrated that sUASs have the ability to drasticially increase the information availible to policymakers at a fraction of the cost of measuring this data by terrestrial means. One such impact would be inconvenience to directly proximal and non-essential personnel that would be displaced from public or business owned property if it is deemed to be unsafe. In this case we relay our needs for a flight zone with the requirement that it be safe from casual intrusions and allow the business time to shift operations in order to minimize potential safety issues. This is best performed with the aid of safety personnel that actively steer non-essential persons around the flight zone.

1. The effect of an exemption for MSAerial on the quality of the natural and social environments

Utilizing sUASs minimizes the requirement for conventional aircraft. This eliminates the need for an onboard pilot, time consuming adherance to regulations surrounding bookeeping and submission of flight paths to local civiliar or military airports, and detrimental effects to the environment caused by operating a combustible fuel based, large scale aircraft, with restrictions on the proximity to the target for remote sensing.

III. Flight Capabilities and Characteristics of MSAerial's UASs

Persuant to 112 P.L. 95 §333 (a), concerns for public safety are mitigated by the overall capabilities and characteristics of the sUAS.[1]

MSAerial UASs utilizes eight (8) counter-rotating propellers paired oppositely to each other for balance, control and stability. The total span of the sUAS is ~1.2m allowing for stable flight or landing even with the sudden onset of detrimental environmental conditions. The sUAS's have a maximal unit + payload mass of 11kg, including cinematic/photographic or other surveying equipment. MSAerial's sUAS is designed to primarily hover in place to capture photographic data and then operate at less than a 35 knot maximum speed to the next point of interest. They are capable of vertical and horizontal operations but, in practice, is operated only within unaided VLOS of the PIC. In addition to the PIC, MSAerial employs a spotter (VOS role) and a technician (secondary VOS and on-site personnel liason) which are within unaided verbal communication range. These personnel are supplemented by safety offcials provided by the client who are instructed to cordon

[1]More characteristics have been outlined in the enclosed supplemental materials.

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off and otherwise minimize pedestrian access in the flight zone of the client's grounds. In the event of loss of visual of the UAS, the PIC can change flight controls from cartesian (X,Y,Z) based controls to radial (r,α,h) based controls which allows the PIC to utilize one controller axis to recall the UAS to the PIC's position without concern to the current heading of the sUAS. In the event of loss of sight of the sUAS into an area containing hazards or possible hazards, the spotter has a heads-up-display containing a live video feed which can be used to locate the UAS while it maintains it's position in hover mode. The sUAS has demonstrated it's ability to maintain it's position by GPS coordinates in hover mode in ~25kph wind gusts at ~25 feet representing an extreme environmental condition beyond the range of conditions within the scope for sUAS operation.

All of MSAerial's sUASs utilize LiPo (lithium polymer) battery based power sources, decreasing safety risks from more easily combustible, fuel based, power sources. Flight times generally last between eight (8) to ten (10) minutes allowing the staff to work with small flight areas per phase. The maximum flight time without payload is 15 minutes, however practical safe operation limits this to 10 to give ample time to control the sUAS to a safe landing zone. MSAerial further restricts flight time by not operating its sUASs with less than twenty five percent battery capacity. Further safety management systems in place include a GPS mode that allows MSAerial sUASs to hover in place if communication with the PIC is lost and optionally follow a set of waypoints at a set speed and height to a 'home base' predesignated safe landing zone. In the event of unforseen motor(s) failure, the system will enter into a controlled descent while allowing full use of all UAS flight controls by the PIC. All commands sent via remote controller received during a controlled descent are translated to an 'as meant' paradigm meaning the flight control package will use it's realtime 3 dimensional position and compensate rotors control the sUAS regardless of spin velocity. Landing gear is also programmed to deploy based on sensing of range to ground from non-GPS based sources. This assures that if one system is compensated a safe and successful landing can still occur.

IV. Reasons Why an Exemption to MSAerial Will Not Adversely Affect Safety Standards

MSAerial's contends that operation of it's sUASs will not "create a hazard to users of the national airspace system or the public." as stated in 112 P.L. 95 §333 (b). Given the diminuative size and weight of MSAerial's sUASs, combined with their operation in cordoned off and well-controlled areas, MSAerial's sUASs falls within Congress's contemplated safety zone. MSAerial sUASs have an established safety record bolstered by multi-point preflight checklist, awareness of their surroundings and intimate knowlege of the behaviour of the sUAS platform in many weather conditions. This safety record and implemented operational practices demonstrate an awareness of public safety.

MSAerial operations routinely provide a level of safety at least equal to existing rules, and in nearly every instance, exceeds existing rules. MSAerial has worked very closely with the regional vendors and support for this unit to create a tightly integrated and highly fault tolerant platform that has been tested throughly by a vendor with a proven record for safety and solid designs.

Though it does not mitigate safety it is of note that as of Nov 2014 there are few companies that will insure sUAS operations and sUAS based companies. The sUAS of use at MSAerial is one of two models (by current awareness) that qualify for protection against damages or injury. MSAerial attained the maximal level of insurance to rectify accidental damage or injury. MSAerial also continues to work closely with this organization to identify and mitigate sUAS platform risk due to their expertise in several industries closely related to the aviation and transportation.

MSAerial does not operate its UASs on or near airports and generally has only operated its fleet on private grounds with cordoned off areas or areas under the control of the property owner / client with assistance by safety officials employed by the business. MSAerial determines the areas needed to fulfill the clients' goals and only operates its UASs in these flight zones and only in compliance with well regarded safety protocols set forth initially by the RC UAS trade and hobby groups and recently codified by relevant FARs.

MSAerial standardized on the following practices to ensure safe operation of it's UASs:

- Work with on-site personnel to plan the flight goals,
- Work with on-site personnel to restrict access to non-essential persons,
- Operation by unaided VLOS operation only,
- Operation in phases 10 minutes in length,
- Operation to minimal 25% battery power,
- Operation of device to GPS aided readout to 300ft at maximum,
- Numerous pre-programmed fail-safes that ensure specific behavior per issue,
- Three main roles supplemented by on-site safety personnel,
- Employ controlled lifecycle management of components to guard against multiple failures,
- Preform a site check day(s) before flight to identify potential issues,
- Subscribe to relevant local weather and safety alerts,
- Expertly choose data collection instruments and accessories to minimize flight requirements or expertise,
-

MSAerial has experience in similar fields and has adapted this experience in it's use of UASs to increase safety. In combination to the ever expanding knowlege repositories from hobbyists and experts alike, MSAerial is constantly evolving it's practices when there is a clear benefit to operations or increased safety element.

A. 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:

MSAerial (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) & (b); 91.405 (a); 91.407 (a) (1); 91.409 (a) (2); 91.409 (a) (2) and 91.417 (a) & (b) to operate commercially a small unmanned vehicle (11kg or less) in elevated photographic and remote sensing operations.

Approval of exemptions allowing commercial operations of sUASs in the the media industry will enhance safety by reducing risk associated with conventional aircraft operations and other means of elevated remote sensing involving persons. The public benefit served by approval of this petition is increased awareness of characteristics of difficult imaging targets. A sUAS weighing fewer than 11kg and powered by sealed batteries eliminates virtually all associated risk inherent in operating conventional aircraft in close proximity to buildings or persons or otherwise elevating persons to a position they would be able to collect needed data.

The operation of small UASs, weighting 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.

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As identified and described herein, Melinda Sokoloski, and her company MSPhotography DBA MSAerial, is an experienced, recognized media services professional in the various photographic industries. Mrs. Sokoloski and her companies have been producing and delivering media and technical solutions for the media service industry for ten (10) years with a spotless safety record.

The FAA has been given the authority to issue the exemption to MSPhotography DBA MSAerial pursuant to the Federal Aviation Act, 85 P.L. 726 (1958), and as such, we humbly seek your consideration and approval of this petition.

PIC VLOS Best,

Melinda Sokoloski

encl: Supplement A: Physical characteristics of UAS

encl: Supplement B: Flight Operation and Procedures Manual (FOPM) related to operation

encl: Supplement C: Flight maps in MSAerial regional base

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- All regular and irregular operations are noted with timestamps, relevant UAS metrics and corrective action procedures (CAP) that are performed.
  - Note : All irregular behavior have root cause analysis performed before UAS operation is resumed.

VI. Emergency Procedures

- Loss of Remote Signal
  - The flight package features an optional enhanced fail-safe which returns the UAS to the home base waypoint via the same path taken to point of lost signal.
  - The UAS will then preform a hover over this waypoint and then a controlled landing.
- Loss of GPS signal
  - The system will operate in GPS assisted mode with three (3) satellites.
  - At loss of three (3) GPS satellites, manual mode can be activated or the flight package can be programmed to preform a controlled landing to the home base waypoint.
  - Ground based height ranging is preformed by a seperate system and so loss of GPS will not impact controlled landing in a safe manner.
- Loss of Engine Power
  - In the event of one (1) (or to two oppositely positioned) rotor or motor failure the system will enter into controlled spin where all controls are translated based on current orientation and will behave as normal operation to the PIC to ensure a safe landing,
  - In the event of multiple rotor or motor failures the flight package can be configured to preform a safe landing or attempt operation to home base waypoint.
  - Note : Behavior of the landing location is highly dependant on the position and number of rotors/motors that are affected.
- Loss of Ground Control Software
  - This will not affect operation of the flight. The unit will be piloted to a safe landing area and then landed so that examination of the link can be made.

Best,

Melinda Sokoloski

Commonwealth of Massachusetts
Norfolk, SS. December 31, 2014

On this 31st day of December, 2014, before me, the undersigned Notary Public, personally appeared Melinda Sokoloski, provide to me through satisfactory evidence of identification, which was her Mass. Driver's License, to be the person whose name is signed on the preceding document, and acknowledged to me that she signed it voluntarily as her free act and deed and for its stated purpose.

Carol A. Potter
Notary Public

CAROL A. POTTER
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
October 1, 2015

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CERTIFICATE OF LIABILITY INSURANCE

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1/20/2014

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INSURER-B:	
INSURER-C:	
INSURER-D:	
INSURER-E:	
INSURER-F:	

INSURED
MS Photography
33 Sea Ave
Quincy MA 02169

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YY)	POLICY EXP (MM/DD/YY)	LIMITS	
A	GENERAL LIABILITY			PP4003590	1/21/2014	1/21/2015	EACH OCCURRENCE	$1,000,000
	X COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence)	$100,000
	CLAIMS MADE X OCCUR						MED EXP (Any one person)	$5,000
							PERSONAL & ADV INJURY	$1,000,000
							GENERAL AGGREGATE	$2,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS - COMP/OP AGG	$2,000,000
	X POLICY PROJECT LOC							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	ANY AUTO						BODILY INJURY (Per person)	$
	ALL OWNED AUTOS SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	HIRED AUTOS NON-OWNED AUTOS						PROPERTY DAMAGE (Per accident)	$
	UMBRELLA LIAB OCCUR						EACH OCCURRENCE	$
	EXCESS LIAB CLAIMS MADE						AGGREGATE	$
	DED RETENTION $							
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE Y/N						WC STATU-TORY LIMITS OTHER	
	OFFICER/MEMBER EXCLUDED?						E.L. EACH ACCIDENT	$
	(MANDATORY IN NH) If yes, describe under						E.L. DISEASE - EA EMPLOYEE	$
	DESCRIPTION OF OPERATIONS below						E.L. DISEASE - POLICY LIMIT	$

Hired & Non-owned Auto Liability is included

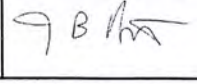
CERTIFICATE HOLDER

Proof of Coverage

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS

AUTHORIZED REPRESENTATIVE



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MSPhotography
Professional Photographic and Media Services

Addr: 33 Sea Ave
Quincy, MA, 02169-3135
Ph: +1-(857)-204-2448
Email: mindi@msaerial.com
Web: msaerial.com

33 Sea Ave, Quincy, MA

Docket Management System
U.S. Dept. of Transportation
1200 New Jersey Ave., SE
Washington, D.C. 20590

MSPhotography, December 31, 2014

Supplement A : Physical Characteristics of MSAerial's UAS

Dear Sir or Madam,

Please find in this document specifications related to the UAS subject to consideration for Exemption. All specifications given by the manufacturer. It is of note that these specifications in some instances constitute the maximal values discovered by the manufacturer and averaged over several test units. MSAerial utilizes these metrics when forming safe and sustainable flight operations and in no way do the specification extrema contained herein constitute normal MSAerial flight parameters.

I. General

Manufacturer Details	
Specification	Value
Manufacturer	DJI
Model	S1000 (Spreading Wings)
Website	www.dji.com
Contact (Ph)	us.support@dji.com
Contact (Em)	+1 (818) 235-0789

II. Physical Characteristics

Frame	
Specification	Value
Diagonal Wheelbase	1045mm
Frame Arm Length	386mm
Frame Arm Weight(with Motor, ESC, Propeller)	325g
Center Frame Diameter	337.5mm
Center Frame Weight	1330g
Landing Gear Size	460mm(L)×511mm(W)×305mm(H)

Motor	
Specification	Value
Stator Size	41×14mm
KV	400rpm/V
Max Power	500W
Weight	158g

Electronic Speed Controller	
Specification	Value
Stator Size	41×14mm
Working Current	40A
Working Voltage	6S LiPo
Signal Frequency	30Hz 450Hz
Drive PWM Frequency	8KHz
Weight (with Radiators)	35g

Propeller	
Specification	Value
Material	Performance engineered plastic
Size	15×5.2inch
Weight	13g

Flight Parameters	
Specification	Value
Takeoff Weight (with payload)	6.0Kg ~ 11.0Kg
Total Weight (system only)	4.2Kg
Power	Battery LiPo (6S,10Ah 20Ah,15C(Min))
Max Inst. Power	4000W
Hovering Power	1500W (@9.5Kg total load)
Hovering Time	15min (@15Ah @9.5Kg total load)
Working Temp	-10 ~ +40 °C

MSPhotography
Professional Photographic and Media Services

Addr: 33 Sea Ave
Quincy, MA, 02169-3135
Ph: +1-(857)-204-2448
Email: mindi@msaerial.com
Web: msaerial.com

33 Sea Ave, Quincy, MA

Docket Management System
U.S. Dept. of Transportation
1200 New Jersey Ave., SE
Washington, D.C. 20590

MSPhotography, December 31, 2014

Supplement B : Summary Sections of Flight Operations and Procedure Manual (FOPM)

Dear Sir or Madam,

I. Introduction

This manual describes the notable roles, tasks, and operations performed by MS photography/MS Aerial. The aim is to document everything that is needed to be done during a mission, so it can act as a reference point for team members.

II. Roles and Responsibilities

As much as is possible, MSAerial staff attempt to have redundancy in expertise and skillsets related to operations of the UAS.

Pilot in Command (PIC)

- Piloting the UAV. This will include:
  - Takeoff,
  - Normal Flight,
  - Flight during emergency procedures,
  - Landing,
- Assembling the UAV
- Performs pre-flight checks of the firmware,

- Performs pre-flight checks of the hardware,
- Preforms pre-flight checks of the software.

Spotter

- Relays notable flight parameters such as flight times, battery strength, metrics from the UAS.
- Primary communication link between pilot and on-site safety personnel,
- Will hold physical documents related to current flight,
- Preforms pre-flight checks of the data collection equipment,
- Monitors ground and greater above-ground environment for safety concerns

Technician

- Assembling the UAV,
- Preforms pre-flight checks of the hardware,
- Performs pre-flight checks of the software,
- Secondary communication link between pilot and on-site safety personnel,
- Relays to the Spotter and records notable flight parameters metrics from the UAS,
- Monitors ground and greater above-ground environment for safety concerns

III. Pre-Flight Checklist

A. Before Power Applied

- Check for physical damage and any missing hardware,
- Check all electronics present and connected/ check coord connections are tight.
- Confirm all batteries charged,
- Check all rotors and moving parts for debris that would prevent proper operation.
- Check weather patterns the night beforehand. S1000 should be raised above the ground when testing landing gear or recalibrating servo travel.
- Check data collection equipment for proper operation.
- Check data collection equipment for issues that would impact safe operation of flight package.

B. After Power Source Applied

- Confirm proper power reading of battery,
- Run hardware based systems check,
- Run software based systems check,
- Check flight LED array,
- Confirm proper radio link to flight controller,
- Confirm proper radio link to data collection device controller,
- Confirm secondary controller connection to UAS onboard flight controller,
- Confirm waypoints and geofences are accurate to current flight,
- Confirm desired behavior of emergency i[ifailsafes,
- Check with on-site safety personnel for any changes in goals / flightpath.

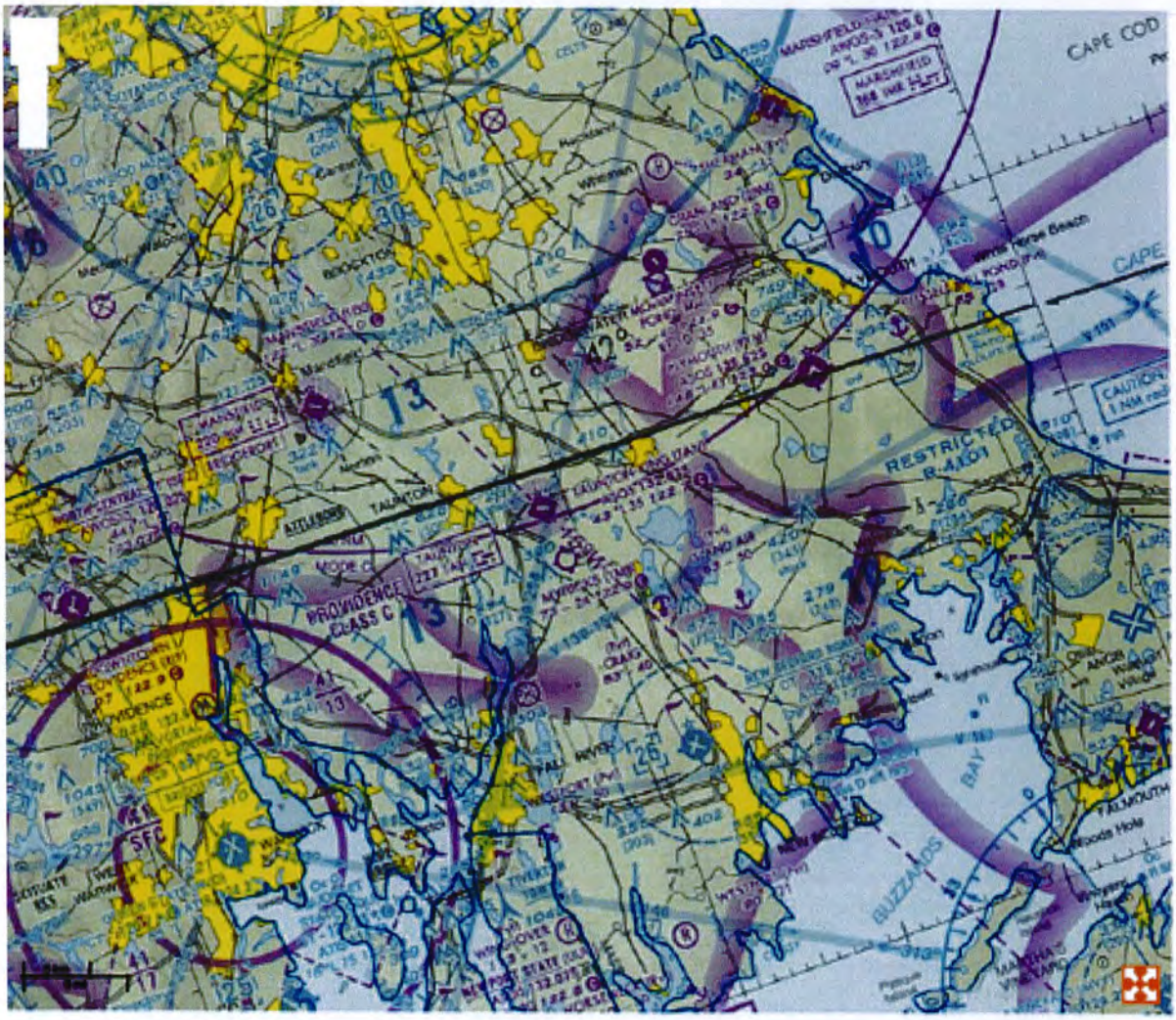
IV. Flight-time Checklist

- Check with on-site safety personnel for a safe flight area for first flight,
- Record relevant metrics in flight log,
- Check for ground hazards at home-base and rectify,
- Confirm > 8 satellite GPS lock,
- Confirm initial state of controllers,
- Initialize rotors and check for proper operation,
- Perform controlled flight to hover mode approximately 5m above ground,
- Check landing gear flight mode (up) operation,
- Perform controlled multi-axis roll procedure to check for proper orchestrated rotor operation,
- Perform controlled multi-axis (if applicable) control procedure of data collection package,
- Switch controller mode to radial based, check proper operation to maximum 5m distance to PIC and return to initial position,
- Return UAS to normal orientation,
- Perform controlled flight to hover mode approximately 1m above ground,
- Check landing gear landing mode (down) operation,
- Land the UAS and check for proper de-initialization of rotors,
- Perform controlled flight to hover mode approximately 5m above ground,
- Check landing gear flight mode (up) operation,
- Operate UAS to each waypoint / position until maximum flight time is achieved,
- Return UAS to normal orientation,
- Perform controlled flight to hover mode approximately 1m above ground,
- Check landing gear landing mode (down) operation,
- Land the UAS and check for proper de-initialization of rotors,
- Remove power to the flight package,
- Remove power to the data collection package,
- Remove power to controllers,
- Complete flight log.

V. Standing Procedures

- The Pilot, Spotter, and Technician will be the only MSAerial staff members in the forward flight area. On-site personnel will be within verbal range and behind MSAerial staff.
- The maximum power used to control the device is soft limited to 75% in order to maintain power in reserve for unforeseen conditions,
- Flight time is limited to 15 minutes and goals will be planned in phases to be accomplished during this time.
- Flight time is limited to reserving 25% battery power,
- Flight height is soft limited to visible and unaided line of sight (VLOS), and hard limited to 300ft, whichever is less.
- Flight time is limited to operation in safe environmental conditions,
- Flight staff will maintain proximity so as to be in clear and unaided verbal range,
- The PIC will announce all movements to MSAerial and on-site staff so that non-PIC staff members can identify possible safety concerns before operation of the UAS to the next waypoint or position,

MS Photography/MS Aerial



Operations Area (Attached VFR Chart with Coordinates)

41° 59' 13" N / 70° 57' 54" W

CERTIFICATE OF AIRCRAFT INSURANCE

DATE (MM/DD/YYYY): 10/6/2014

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Transport Risk
12424 Big Timber Drive, Suite 5
Conifer, CO 80433

CONTACT NAME: Transport Risk
PHONE (A/C, No, Ext): 720.208.0844 FAX (A/C, No): 720.208.0845
E-MAIL ADDRESS:
PRODUCER CUSTOMER ID #:

INSURED
MS Aerial and MS Photography
33 Sea Avenue
Quincy MA 02169

INSURER(S) AFFORDING COVERAGE	%	NAIC #
INSURER A : StarNet Insurance Company	100	40045
INSURER B :		
INSURER C :		
INSURER D :		
INSURER E :		
INSURER F :		

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

POLICY INFORMATION

CERTIFICATE NUMBER: 21910614 **REVISION NUMBER:**

POLICY TYPE						LINE OF BUSINESS SUBCODE									
	INDUSTRIAL AID		PLEASURE & BUS	✓	COMMERCIAL		AIRPLANE		HELICOPTER		MIXED FLEET		EXCESS		QUOTA SHARE
	NON-OWNED					✓	LIABILITY ONLY		HULL & LIABILITY		HULL ONLY				

AIRCRAFT INFORMATION

YEAR	MAKE	MODEL	SERIAL NUMBER	REGISTRATION NUMBER
2014	DJI	S1000	TRM767	N/A

TERRITORY:

AIRCRAFT COVERAGES

INSURER LETTER	POLICY NUMBER	EFFECTIVE DATE	EXPIRATION DATE	ADDITIONAL INSURED? (Y / N)	SUBROGATION WAIVED? (Y / N)
A	BA-14-05-00210	5/21/2014	5/21/2015	Y	N

COVERAGE		OPTIONS		LIMIT	APPLIES TO	LIMIT	APPLIES TO
AIRCRAFT HULL				$		$	
				$			
AIRCRAFT LIABILITY	✓			$ 1,000,000	EA OCC	$	EA PER
				$ EXCLUDED	EA PASS	$	AGGR
MEDICAL PAYMENTS		INCLUDING CREW		$	EA PER		
	✓	EXCLUDING CREW		$ 5,000			

COVERAGE CODE	COVERAGE DESCRIPTION	OPTIONS		LIMIT	APPLIES TO	LIMIT	APPLIES TO
				$		$	
				$		$	
				$		$	
				$		$	
				$		$	
				$		$	

DESCRIPTION OF OPERATIONS / REMARKS (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

It is agreed that the Certificate Holder is included as an Additional Insured under the Aircraft Liability Coverages, but only to the extent of liability vicariously imposed upon the Certificate Holder solely as the result of an act or omission of the Named Insured or its employees in connection with the Named Insured's Aircraft operations, subject to all policy terms, conditions and exclusions.
The Company has made the provision to give the Certificate Holder prompt notice of cancellation of any policy above. But, the company assumes no responsibility for failure to provide such notice. This Certificate does not change in any way the actual coverage provided by the policy.

CERTIFICATE HOLDER

Bridgewater State University
131 Summer Street
Bridgewater MA 02325

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Diane Beane

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MS Photography
Melinda Sogoloski
33 Sea Ave
Quincy, 02169
Massachusetts, United States

DELIVER TO:
MS Photography
Melinda Sogoloski
33 Sea Ave
Quincy, 02169
Massachusetts, United States

Order #: H599494

Date of Order: 04/29/2014

Payment method: Credit Card

Products	SKU	Qty Ship	Qty BO	Price (EX)	Total (inc)
DJI S1000 PREMIUM, A2 AND ZENMUSE 5D MKIII COMBO SN # 02Q0020888	**DJI-S1000PA5**	1		$6,560.00	$6,560.00
FUTABA 10JH 2.4G Heli R3008SB S/FHSS Mode 2 SN # B40313003	**FUTK9201**	1		$349.98	$349.98
PLU15-160006 PULSE LIPO 16000mAh 6S1P 22.2V 15C	**PLU15-160006**	1		$0.00	$0.00
				SubTotal:	
				Shipping Cost:	$0.00
				Total:	**$6,909.98**
				Total Payment Paid:	$7,519.96
				Total Refunded:	$609.98

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Federal Aviation Administration

FAA UAS Civil COA Request

Any information that is provided is bound by the Freedom of Information Act (FOIA) and may be releasable. This requires compliance to FOIA and consent to the release of your information. If you do not consent to the release of your information, you must contact us for further guidance. For more information, please visit http://www.foia.gov/.

Date: Dec 31st 2014

333 Exemption # or Federal Register Docket #:

Proponent Information

Contact Name	Melinda Sokoloski
Company Name	MS Photography DBA MS Aerial
Street Address 1	33 Sea Ave
Street Address 2	
City	Quincy
State	MA
Zip Code	02169
Phone Number	857-204-2448
E-mail Address	mindi@msaerial.com

Aircraft System

Aircraft Type	UAV
Aircraft Registration	SN # 02Q0020888

Performance Characteristics

Climb Rate (Feet/Minute)	350 feet per minute	Descent Rate (Feet/Minute)	250/350 per minute

Turn Rate (Degrees/Second)	8° introversive and a 3° in	Approach Speed	maximum thrust of 2.5
Cruise Speed Max	30-45 mph	Min	Hover
Gross Takeoff Weight	11 kg Max	Launch/Recovery	Automated Return to L

Operational Information

Location

Bridgewater State University (131 Summer Street, Bridgewater, MA 02324) Possibly other privately owned locations within the New England area

Altitude: 200 Feet

Distance from nearest Town/City:

Description of Operation

Melinda Sokoloski along with a pilot and an observer have been asked to film a few moments of B roll in a tightly controlled enviroment. On the Campus of Bridgewater State university. There will be a few days of filming. Projected filming for other companies would take place in similar conditions, meaning saftey and education would be on the forefront. This includes knowijng regulations and weather conditions.

Operations Area (Attach VFR Chart with Coordinates)

Class of Airspace

- ☐ A
- ☐ B (Requires FAA HQ approval)
- ☐ Under Mode C Veil
- ☐ C
- ☐ D
- ☐ E
- ☑ G
- ☐ G (With an operational ATC Tower)

Flight Conditions

- ☑ VFR
- ☐ IFR

Air Traffic Communication

	Transmitter	Receiver	Guard (Emergency Frequency)
☐ VHF	○ Yes	○ Yes	○ Yes
	○ No	○ No	○ No

	Transmitter	Receiver	Guard (Emergency Frequency)
☑ UHF	◉ Yes ○ No	◉ Yes ○ No	◉ Yes ○ No

Procedures

Lost Link Procedures

1. How long to activate LL procedure

Immeditely after line of sight may be compromised. There are 2 spotters at all times

2. LL Altitude

450 feet

3. Lost Link Route

f I tell it to or the signal is dropped it will fly back to where it is told. I preprogram the altitude it is

4. Lost Link Point

Beyond line of sight. We do not fly beyond line of sight.

5. Flight Termination Point

Never beyond line of sight and below 450'

Lost Communication Procedures

1. Between Pilot and Air Traffic Control

The MSPhotography/MS Aerial team would never be within in the range of airfields or restricted airspace. The coordinates are: 41° 59' 25" N / 70° 58' 32" W

2. Between Pilot and Observer

Procedurally we would not allow an observer to be any farther than speaking distance. It can be said that fundamentally, the primary role of the observer is to maintain communication with the pilot as a first directive..

Observer

Line of Sight of Observer

☑ Yes

☐ Other

Observer Location: Close enough to be within speaking distance.

Time of Day: ◉ Day ○ Night ○ Both

Transponder: ◉ Yes ○ No ○ N/A Mode C ☐

Please return completed form to 9-AJV-115-UASOrganization@faa.gov.