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

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

May 11, 2015

Exemption No. 11525
Regulatory Docket No. FAA–2015–0338

Mr. William V. O'Connor
Mr. William D. Janicki
Ms. Joanna L. Simon
Morrison & Foerster LLP
12531 High Bluff Drive
San Diego, CA 92130

Dear Messrs. O'Connor and Janicki and Ms. Simon:

This letter is to inform you that we have granted your request for exemption. It transmits our decision, explains its basis, and gives you the conditions and limitations of the exemption, including the date it ends.

By letter dated February 9, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Pro Drones Canada Inc. (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct oil and gas pipeline inspections, solar installation inspections, power line/cable inspections, cooling tower inspections, forestry, critical infrastructure inspections, wind turbine inspections, and radiation measurement and monitoring.

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. However, the FAA received one comment for the petition made to the docket.

Airworthiness Certification

The UAS proposed by the petitioner is an MD4−200

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

[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, Pro Drones Canada Inc. is hereafter referred to as the operator.

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

1. Operations authorized by this grant of exemption are limited to the MD4−200 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 May 31, 2017, unless sooner superseded or rescinded.

Sincerely,

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

Enclosures

MORRISON | FOERSTER

12531 HIGH BLUFF DRIVE
SAN DIEGO, CALIFORNIA
92130-2040

TELEPHONE: 858.720.5100
FACSIMILE: 858.720.5125

WWW.MOFO.COM

MORRISON & FOERSTER LLP

BEIJING, BERLIN, BRUSSELS, DENVER, HONG KONG, LONDON, LOS ANGELES, NEW YORK, NORTHERN VIRGINIA, PALO ALTO, SACRAMENTO, SAN DIEGO, SAN FRANCISCO, SHANGHAI, SINGAPORE, TOKYO, WASHINGTON, D.C.

February 9, 2015

Writer's Direct Contact
+1 (858) 720.7932
WOConnor@mofo.com

U.S. Department of Transportation
Docket Operations, M-30
1200 New Jersey Avenue, SE
Room W12-140, West Building Ground Floor
Washington, DC 20590-0001

Re: ***Petition of Pro Drones Canada Inc. for an Exemption Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 to Operate an Unmanned Aircraft System***

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the Reform Act) and 14 C.F.R. Part 11, Pro Drones Canada Inc. (Pro Drones),[1] the North American manufacturer, distributor, and operator of the MD4-200, hereby applies for an exemption from the Federal Aviation Regulations identified below.

The requested exemption would permit Pro Drones' commercial operation of the MD4-200, which is a miniaturized VTOL-aircraft (Vertical Take Off and Landing). The MD4-200 can fly by remote control or autonomously with the aid of Pro Drones' GPS Waypoint navigation system. The MD4-200 can be used for a variety of purposes, including oil and gas pipeline inspections, solar installation inspections, power line/cable inspections, cooling tower inspections, forestry, critical infrastructure inspections, wind turbine inspections, and radiation measurement and monitoring.

Use of the MD4-200 for survey and inspection activities reduces the need to operate conventional aircraft for the same purposes and provides extremely high quality imagery and modeling at a fraction of the price and time for the same activities done by conventional aircraft. Use of the MD4-200 therefore results in enhanced efficiency, environmental benefits, and increased safety.

[1] Pro Drones Canada Inc. dba Avyon, www.Avyon.com, and dba Flyterra, www.Flyterra.com.

Operation under the requested exemption will be subject to strict operating parameters, set forth more fully herein. These parameters will ensure at least an equivalent level of safety to currently authorized operation using manned aircraft.[2]

I. REGULATIONS FOR WHICH EXEMPTION IS REQUESTED

Pro Drones requests exemption from the following regulations:

- 14 C.F.R Part 21, Subpart H;
- 14 C.F.R Part 27;
- 14 C.F.R § 45.23(b);
- 14 C.F.R. § 45.27(a);
- 14 C.F.R § 61.113;
- 14 C.F.R § 91.7(a);
- 14 C.F.R § 91.9(b)(2);
- 14 C.F.R § 91.9(c);
- 14 C.F.R § 91.103;
- 14 C.F.R § 91.109(a);
- 14 C.F.R § 91.119;
- 14 C.F.R § 91.121;
- 14 C.F.R § 91.151(a) & (b)
- 14 C.F.R § 91.203 (a) & (b);
- 14 C.F.R § 91.405(a);
- 14 C.F.R § 91.407(a)(l);
- 14 C.F.R § 91.409(a)(2);
- 14 C.F.R § 91.417 (a) & (b).

This petition incorporates the material contained in the Pro Drones MD4-200 Operations, Inspection, and Maintenance Manual , the Pro Drones MD4-200 Training/Experience Manual, and the MD4-200 Operators Handbook (together, the "Manuals" at Attachments 1-3). The Manuals are submitted herewith as confidential under 14 C.F.R. § 11.35(b), because they contain commercial and proprietary information that Pro Drones has not and will not share with others, is not available to the public, and is protected from release under the Freedom of Information Act, 5 U.S.C. § 552 *et seq.*

[2] While Pro Drones is filing this petition for exemption on its own behalf, it anticipates that future customers may file exemptions to allow them to operate the MD4-200 at their own facilities, which will be substantially similar to this petition.

II. STATUTORY AUTHORITY FOR REQUESTED EXEMPTIONS

This petition for exemption is submitted in accordance with Section 333 of the Reform Act. Congress has directed the FAA "to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system." Pursuant to Section 333 of the Reform Act, the FAA Administrator is to permit operation of an unmanned aircraft system where it does not create a hazard to users of the national airspace system (NAS) or the public or pose a threat to national security based on the following considerations:

- The size, weight, speed and operational capability;
- Operation in proximity to airports and populated areas; and
- Operation within visual line of sight of the operator.

Furthermore, the Federal Aviation Act grants the FAA Administrator general authority to grant exemptions from the agency's safety regulations and minimum standards when the Administrator decides a requested exemption is in the public interest. *See* 49 U.S.C. §§ 106(f), 44701-44716, *et seq*. A party requesting an exemption must explain the reasons why the exemption: (1) would benefit the public as a whole, and (2) would not adversely affect safety or how it would provide a level of safety at least equal to the existing rules. 14 C.F.R. § 11.81.

III. DESCRIPTION OF PRO DRONES AND ITS SERVICES

Pro Drones provides professional Unmanned Aircraft System solutions, delivering customized services with its UAS products including surveying and mapping solutions.

Pro Drones is based in New York (USA) and Alma (Canada). In 2014, Pro Drones acquired the exclusive rights to manufacture, distribute and develop custom solutions for Microdrones products in North America. Microdrones, GmbH is the pioneer of vertical take-off and landing drones for professionals and has sold several thousand drones in Europe, Asia, Russia and North America. Pro Drones is now the exclusive manufacturer and distributor of Microdrones products in North America, and is a permanent part of the Microdrones research and development program.

Pro Drones provides UAS solutions for utilities, allowing for safer and high precision inspections of sites including power lines, pipelines, railways, wind mills. Pro Drones' services also support security and safety operations, such as monitoring or searching hard to access areas. Pro Drones' products also allow unprecedented access to geospatial data to support civil engineering projects, providing up-to date imagery to allow for precise volumetric measurement of stockpiles and bulk materials. The UAS products can also provide detailed and timely land and crop information from scouting land to conducting

multispectral imagery collection for applications from precision agriculture to monitoring conservation lands.

The contact information for Pro Drones is as follows:

Vivien Hériard Dubreuil
Pro Drones Higher Solutions
President
www.Pro Drones.com
Tel (418) 800-0403
vivien@Pro Drones.com

C/O William V. O'Connor
William D. Janicki
Joanna L. Simon
Morrison & Foerster LLP
12531 High Bluff Drive
San Diego, CA 92130
Tel (858) 720-5100
WOConnor@mofo.com
WJanicki@mofo.com
JoannaSimon@mofo.com

IV. DESCRIPTION OF PROPOSED OPERATIONS

A. The MD4-200

The MD4-200 was conceived and manufactured by Microdrones GmbH, but is operated and sold in North America by Pro Drones. Over 600 MD4-200s have been sold to date. Globally, the MD4-200 has completed thousands of flight hours. The MD4-200 is operational throughout Canada, Europe, China, South-East Asia and Australia, performing tasks in the field of documentation, coordination, exploration, surveying, communication, inspection and observation.

The MD4-200 flight and navigation controller centers around an inertial measurement unit, consisting of an accelerometer and a gyroscope for each axis, supplemented by a 3-axis magnetometer, a barometric altitude sensor and a GNSS receiver. With all these sensor readings put together in software called a "Kalman Filter," the MD4-200 is able to fly self-stabilized with GNSS Position Hold. The operator can control the movements in terms of going forward or backward, left or right, up or down, turning left or right, trigger payload cameras to take pictures or change the zoom. As soon as there is no input from the operator, the MD4-200 will stay on the spot, waiting for the next command. It is possible to let the MD4-200 hover in the same spot for several minutes.

The complete MD4-200 is a system of systems. Every important function is maintained by its own controller. From the central unit for flight and navigation control the main bus connects to an independent motor controller for each of the four motors as well as an I/O and

payload controller. This distributed architecture ensures reliable and high performance operation of the MD4-200.

Figure 1: The MD4-200

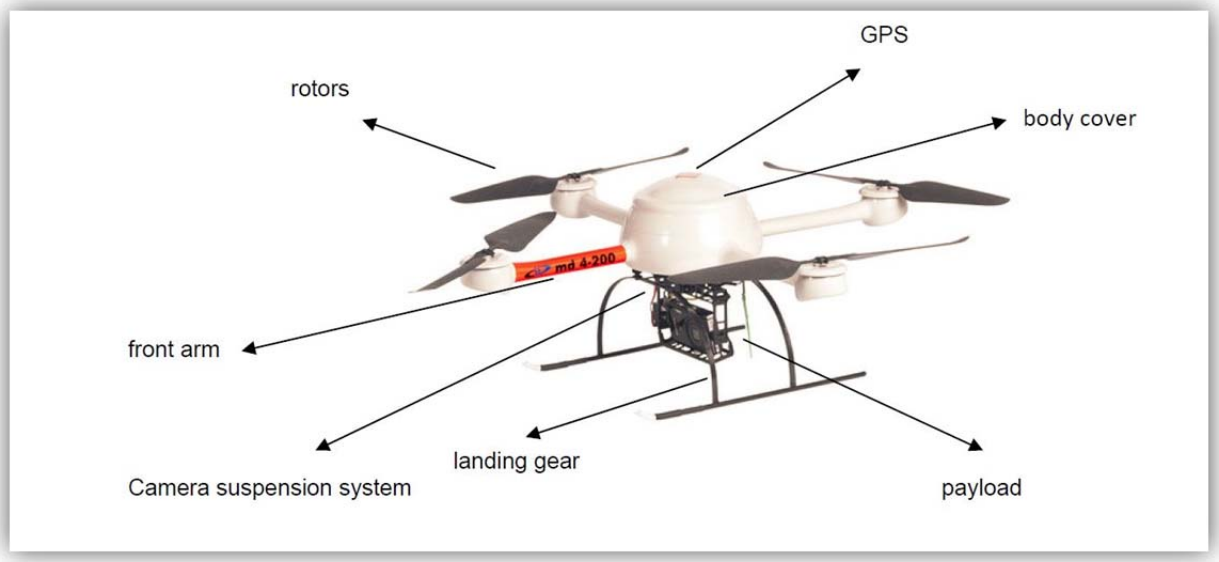


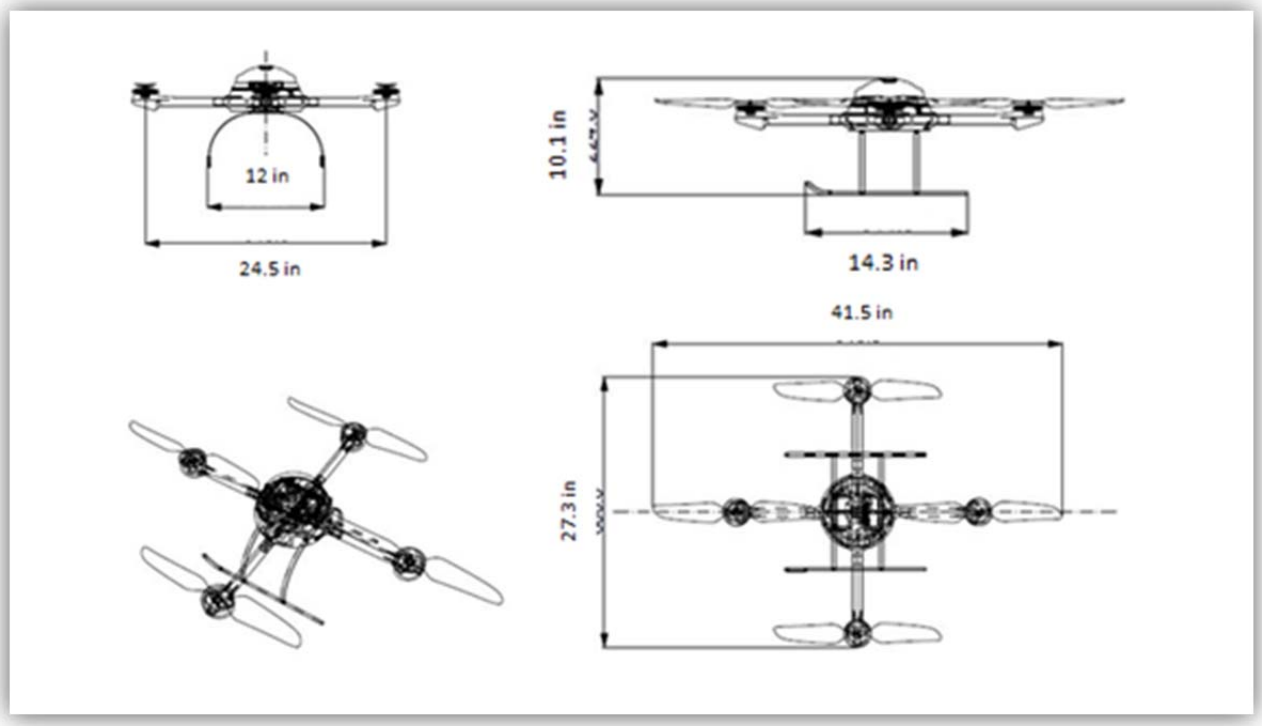
Figure 2: Technical Specifications

Number of motors	4
Type of Motors	Flat-core brushless
Rotor Speed (hovering)	1800 rpm
Cruise Speed	18 mph
Power	Battery – 14.8V, 4S LiPO, 2300 mA
Total weight (not including payload)	1.76 lbs
Max Payload	0.66 lbs
Climb Rate	16 mph
Max Thrust	15.5 N
Maximum Endurance	35 minutes

Figure 3: Operations Specifications

Temperature	-4 degrees F – 122 degrees F
Humidity	Max. 90%
Wind tolerance	Steady pictures up to 4m/s
Flight radius	Minimum 500m on RC, with WP up to 6km/4 miles
Ceiling altitude	Up to 1000m/3,200ft
Take-off altitude	Up to 4000m ASL/13,000ft

Figure 4*: *Technical Drawings of the MD4-200



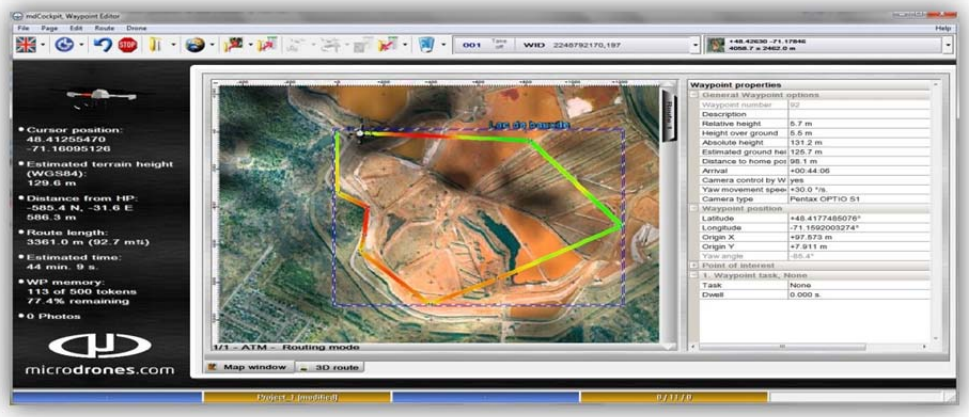
B. The MD4-200 Flight Control System

The MD4-200 Ground Control Station (GCS) serves as the operator interface, coordinating the mission and communication functions including mission planning, near real-time mission progress, video display and function monitoring. The GCS consists of a laptop and mission planning/execution software (mdCockpit), the command and control (mdDRC) and the data link receiver.

The MD4-200 can be operated in two modes: in the first mode, the pilot is in control of the MD4-200 and in the second mode, the mission is conducted through automated waypoints planned in the mdCockpit software. The mdCockpit program conducts mission planning for the MD4-200, with complete route planning to include waypoints, identify No-Fly zones and take into consideration the terrain height. The mission planning information is up-loaded to the MD4-200 prior to flight. During flight, mdCockpit provides complete management of the MD4-200 mission. The following is provided during flight to the operator:

- Moving map showing the location of the MD4-200
- Speed
- Heading
- Altitude
- Climb rate
- GNSS status and availability
- Link status
- Battery status
- All safety systems and alarms (audio and visual)

Figure 5: mdCockpit Mission Planning Software



The mdDRC provides the command and control link to the MD4-200. The MD4-200 system provides to the user the data downlink from the main variables during the flight, which is received by the mdDRC. The information is decoded and shown on the Graphical User Interface (GUI), allowing the user to know in real time the status of the MD4-200. The main command and control link operates at a frequency of 900 MHz and provides command inputs from the pilot and flight information from the MD4-200 back to the mdDRC. The mdDRC uses the 9XTend Modem, which has FCC regulatory approval.

Figure 6: Command and Control Link

The data link on the MD4-200 allows for the payload and MD4-200 system information to be transmitted in near real-time between the MD4-200 and the GCS. The data link operates at a frequency of 2.4 GHz.

Figure 7: Data Link and Laptop

Notable features include:

- **Lost Link Mission Procedures**: If at any time during the mission the command and control link is lost between the mdDRC and the MD4-200, the MD4-200 will immediately enter into the GPS Position Hold and try to acquire the signal for a specified time (set at 30 seconds). If the time runs out before reacquiring the signal, the MD4-200 will enter into emergency landing or homing mode, depending on the operator's setting. Emergency landing will land the MD4-200 in location at a descent speed of 1.0 mph. In homing mode, the MD4-200 will climb to a predefined altitude and then return to the take-off location in a straight line for emergency landing at the take-off location. If at any time during the procedure the link is reacquired, the operator will take full control.

- **Lost GPS Procedures**: Flight control will revert to inertial navigation mode and MD4-200 stabilization is maintained. The pilot is notified by textual, graphic and spoken message and has to hold position with input from the mdDRC. GPS hold will reactive when the signal improves.

- **Lost Link and GPS Procedures**: If both signals are lost, the MD4-200 will immediately enter emergency landing with a descent speed of 1 mph.

- **GPS Hold**: If the MD4-200 approaches the Virtual Fence (a virtual boundary set by GPS data points), it will slow down and stop before entering the fenced area. The GPS Position Hold stays in effect until the pilot steers the MD4-200 back towards the interior of the fence. GPS Hold will also stabilize the flight if the MD4-200 reaches critical speed or critical pitch or role angle.

- **Monitoring and Notification of Emergency Situations**: The pilot is notified to take corrective action if wind speed increases, the flight reaches critical altitude and/or distance, the motor approaches the performance limit, or the battery voltage approaches a level just adequate to return to the landing zone.

C. Pro Drones' Proposed Operations Demonstrate an Equivalent Level of Safety

1. General Description of Proposed Flight Operations

Pro Drones proposes to operate only on privately-owned, remote locations and within the limitations and performance specifications listed in the Manuals, which are summarized below.

The MD4-200 will be used for a variety of purposes including utilities inspections, vertical inspections of infrastructure, security and safety monitoring, geospatial analysis for civil engineering projects, and data collection for agricultural lands.

The proposed operations do not create any hazard to users of the national airspace system or pose a threat to national security. The aircraft is a battery operated quadcopter and weighs approximately 1.76 pounds with a maximum takeoff weight of approximately 2.42 pounds. The vehicle's ground speed has a maximum of 18 mph, and it will operate at or below 400 feet AGL. The MD4-200 has a 3-axis magnetometer, a barometric altitude sensor and a GNSS receiver, enabling it to fly self-stabilized with GNSS Position Hold.

Manned aircraft are at risk of fuel spillage and fire in the event of an incident or accident. The MD4-200 carries no fuel, and therefore the risk of fire following an incident or accident due to fuel spillage is eliminated. Compared to manned aircraft, the MD4-200 reduces the risk to participating persons in close proximity to the aircraft due to the limited size, weight, operating conditions, and design safety features of the MD4-200.

The FAA has determined that the risk of not having an electronic means to monitor and communicate with other aircraft, such as transponders or sense and avoid technology, is mitigated by placing limits on altitude, requiring stand-off distance from clouds, permitting daytime operations only, and requiring that the aircraft be operated within visual line of sight and yield right of way to all other manned operations. Additionally, the operator will request a NOTAM prior to operations to alert other users of the NAS. *See* Exemption No. 11062, Docket No. FAA 2014-0352, at p. 13, attached hereto as Attachment 4.

The petitioner's aircraft has the capability to operate safely after experiencing certain in-flight failures, as specified above in the description of the Flight Control System. The aircraft is also able to respond to a lost-link event with a pre-coordinated, predictable, automated flight maneuver either landing safely at that location or returning to its take-off location, which can be set by the operator.

2. Specific Limitations on Proposed Flight Operations

Given the small size involved, the restricted environment within which they will operate, the procedures listed below, and pilot certification requirements, Pro Drones' proposed operations using the MD4-200 would "not create a hazard to users of the national airspace system or the public or pose a threat to national security." Reform Act Section 333(b)(1).

1. The aircraft is approximately 1.76 pounds.

2. The aircraft will be identified by serial number, registered with the FAA, and will have identification (N-Number) markings as large as practicable.

3. Flights will be operated within visual line of sight of the pilot in command (PIC).

4. Prior to each flight, a zero altitude initiation point will be established and confirmed for accuracy by PIC.

5. Maximum flight time for each operational flight will be 35 minutes.

6. The aircraft will be safely landed with no less than the greater of (a) 20% battery life remaining or (b) seven minutes of flight time remaining.

7. The aircraft will be operated during daylight and in VFR conditions.

8. Flights will not exceed 400 feet AGL.

9. Flights will be operated at a lateral distance of at least 50 feet from any persons or property not associated with the operation who have not given prior permission.

10. Flights will be limited to a groundspeed of 18 mph.

11. Minimum crew for each flight will consist of a PIC and a Visual Observer.

12. All PICs will be qualified pursuant to one of the two options below.

    a) FAA private pilot certificate, third class medical certificate, and completed factory certified training in md4-200 operations; or

    b) Approved for md4-200 operations by Transport Canada pursuant to Special Flight Operations Certificate, competed FAA certified private pilot ground school, passed FAA private pilot written exam, and completed factory certified training in md4-200 operations. See SFOC dated September 12, 2014 and SFOC dated September 19, 2014 attached as Exhibits 6 and 7.

13. Pro Drones will designate a Flight Operations Manager in accordance with its Manuals. The Flight Operations Manager will be trained on UAS operations, will oversee all training/operations and ensure all PICs and VOs receive proper training and abide by all pertinent regulations.

14. Prior to the flight, a Mission Plan will be created setting forth the limitations for the flight as well as contact information for the PIC.

15. The flight operations will yield the right of way to other manned aircraft operations.

16. All persons who are not involved with Pro Drones' operations will be required to be at least 500 feet from flight operations.

17. The aircraft will only operate over sites with the consent of the owner.

18. Pro Drones will provide NOTAM details to the FAA 24 hours prior to each flight.

19. All required permissions and permits will be obtained from territory, state, county or city jurisdictions prior to flight.

20. Prior to commencing operations, Pro Drones will obtain a Certificate of Waiver or Authorization (COA) from the FAA.

21. If the aircraft loses communications, it will have the capability to return to a pre-determined location within the operational area and land.

22. If the aircraft loses its GPS signal it will have the capability of being flown manually to a predetermined location within the operational area and land.

23. The flight will be aborted in case of unpredicted obstacles or emergencies.

24. Each flight will be recorded in an Aircraft Logbook and by the PIC in a Pilot Logbook.

25. Maintenance on the aircraft will be recorded in an Aircraft Logbook.

3. Flight Recovery, Lost Communications, and Lost GPS Procedures

The flight recovery, lost communications, and lost GPS procedures are documented above, and are more fully documented in the attached Operators Handbook. *See* Attachment 3.

V. PRIOR OPERATIONAL APPROVALS

The MD4-200 has received prior operational approvals in both the U.S. and Canada, further verifying it is safe for use.

- The MD4-200 was granted a COA by the FAA for the "Operation of the Microdrones MD4-200 Unmanned Aircraft System (UAS) in Class G airspace at or below 400 feet

Above Ground Level (AGL) at Musgrave Research Farm, in the vicinity of Aurora, NY, under the jurisdiction of Elmira TRACON." See Attachment 5.

- The MD4-200 was granted two Special Flight Operations Certificates (SFOCs) by Transport Canada. See Attachments 6 - 7.

The FAA COA noted that "[t]he Griffiss International Airport has made its own determination that the Microdrones MD4-200 unmanned aircraft is airworthy." (Attachment 5 p. 3) Transport Canada made a similar finding, stating that Pro Drones dba Flyterra "is adequately equipped and able to conduct a safe operation" using the md4-200. (Attachment 6 p. 1)

VI. SPECIFIC FAR EXEMPTIONS REQUESTED

Pro Drones seeks an exemption from several interrelated provisions of 14 C.F.R. Parts 21, 45, 61, and 91 for purposes of conducting the requested operations using the MD4-200. Listed below are (1) the specific FAR sections for which exemption is sought, and (2) the operating procedures and safeguards that Pro Drones has established which will ensure a level of safety better than or equal to the rules from which exemption is sought. *See* 14 C.F.R. § 11.81 (e).

A. 14 C.F.R. Part 21, Subpart H – Airworthiness Certificates and 14 C.F.R. § 91.203(a)(1)

The FAA has stated that no exemption is needed from this section if a finding is made under the Reform Act that the UAS selected provides an equivalent level of safety when compared to aircraft normally used for the same application. These criteria are met, and therefore no exemption is needed. *See* Attachment 1, Grant of Exemption to Astraeus Aerial, Docket No. FAA 2014-0352 at 13-14, 22. If, however, the FAA determines that there are some characteristics of the MD4-200 that fail to meet the requirements of the Reform Act, an exemption is requested.

Equivalent Level of Safety: The MD4-200 is safe when taking into account its size, weight, speed, and operational capability. The MD4-200 weighs approximately 1.76 pounds and will be flown at speeds less than 25 miles per hour, in visual line of sight of the operator, and in remote and unpopulated airspace over land only with the consent of the owner. The MD4-200 does not carry pilots, passengers, explosive materials, or flammable liquid fuels. The MD4-200 will be operated within the parameters of the Manuals.

Pro Drones will also provide the FAA with advance notice of all operations via NOTAM and coordination with the local FSDO. The proposed operations will be at least as safe as, or safer than, conventional aircraft and/or rotorcraft operating with an airworthiness certificate

without the restrictions and conditions proposed here. The proposed operations will also be as safe, or safer than traditional surveying or inspection activities.

B. 14 C.F.R. Part 27 Airworthiness Standards: Normal Category Rotorcraft

14 C.F.R. Part 27 sets forth the procedural requirements for airworthiness certification of normal category rotorcraft. To the extent the MD4-200 would otherwise require certification under Part 27, Pro Drones seeks an exemption from Part 27's airworthiness standards for the same reasons identified in the request for exemption from 14 C.F.R. Part 21, Subpart H.

C. 14 C.F.R. §§ 45.23(b), 45.27(a) and 91.9(c): Aircraft Marking and Identification Requirements

14 C.F.R. §45.23(b), Markings of the Aircraft states:

> 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.

14 C.F.R. § 45.27(a) states:

> **Rotorcraft.** Each operator of a rotorcraft must display on that rotorcraft horizontally on both surfaces of the cabin, fuselage, boom, or tail the marks required by § 45.23.

14 C.F.R. § 91.9(c) states:

> No person may operate a U.S.-registered civil aircraft unless that aircraft is identified in accordance with part 45 of this chapter.

In a previous Grant of Exemption, the FAA determined that exemption from these requirements was warranted provided that the aircraft "have identification (N-Number) markings in accordance with 14 CFR part 45, Subpart C if the markings are "as large as practicable." *See* Exemption No. 11062, Docket No. FAA 2014-0352, at p. 14.

Equivalent Level of Safety: Pro Drones will mark all MD4-200s with their N-Number in a prominent spot on the fuselage with markings that are as large as practicable.

D. 14 C.F.R. § 61.113: Private Pilot Privileges and Limitations

Pro Drones seeks exemption from 14 CFR § 61.113, which restricts private pilots from flying aircraft for compensation or hire and would also require a second class medical certificate. The purpose of Part 61 is to ensure that the skill and competency of any PIC matches the airspace in which the PIC will be operating, as well as requiring certifications if the pilot is carrying passengers or cargo for hire.

While the MD4-200 will be operated as part of a commercial operation, it carries neither passengers nor cargo. In the Grant of Exemption in FAA Docket No. FAA-2014-0352, the FAA determined that the unique characteristics of small UAS operation outside of controlled airspace did not warrant the additional cost and restrictions attendant with requiring the PIC to have a commercial pilot certificate and a class II medical certificate. The FAA has also determined that the required knowledge for a commercial pilot covers the same fundamental principles as a private pilot. The FAA determined that an equivalent level of safety for small UAS operation could be achieved by requiring a private pilot certificate, a third class medical certificate, and appropriate UAS operational training.

Pro Drones' PICs for the md4-200 will be qualified pursuant to one of the two options below.

a) FAA private pilot certificate, third class medical certificate, and completed factory certified training in md4-200 operations; or

b) Transport Canada approval for md4-200 operations pursuant to a Special Flight Operations Certificate, competed FAA private pilot ground school, passed FAA private pilot written exam, and completed factory certified training in md4-200 operations. See Transport Canada SFOC dated September 12, 2014 and SFOC dated September 19, 2014. (Attachments 6 and 7)

Transport Canada found that Pro Drones, dba Flyterra, and its pilots are "adequately equipped and able to conduct a safe operation" using the md4-200 for the purposes of aerial imagery. (Attachments 6 and 7, p. 1)

Pro Drones' visual observers (VOs) will be trained in Pro Drones' UAS operations. Pro Drone's PICs and VOs will be trained and maintain currency according to the Pro Drones md4-200 Training/Experience Manual. (Attachment 2.)

The requirements above ensure that all PICs and VOs have the knowledge, skill, and training to conduct operations using the md4-200 UAS with an equivalent level of safety.

The FAA stated in its grant of an exception to Astraeus Aerial the "the FAA considers the overriding safety factor for the limited operations proposed by the petitioner to be the airmanship skills acquired through UAS-specific flight cycles, flight time, and specific make and model experience, culminating in verification through testing." See Exemption No. 11062, Docket No. FAA 2014-0352, at p. 18. The proposed operations can achieve an equivalent level of safety by requiring the knowledge and experience in MD4-200 operations described above.

Furthermore, the security screening conducted by the Transportation Security Administration of certificated airmen and applicants for the FAA written examination satisfies the statutory requirement of Section 333 for operations to not pose a threat to national security.

Pro Drones will designate a Flight Operations Manager with an FAA commercial pilot certificate or equivalent Transport Canada pilot certificate and flight instructor certificate. The Flight Operations Manager will be trained in UAS operations and will oversee all training/operations and will ensure all PICs and VOs receive proper training and abide by all pertinent regulations.

The restrictions Pro Drones has placed on its MD4-200 operations meet or exceed the restrictions similarly imposed on Astraeus Aerial in FAA Docket No. FAA-2014-0352. Pro Drones will operate in unpopulated areas with the consent of the land owner away from persons and property not involved in the operation. The small aircraft will be flown based on VLOS at or below 400 feet AGL. A NOTAM will be issued at least 24 hours before the flight is to occur, and the flight will be coordinated with the applicable FSDO. Therefore Pro Drones' proposed PIC requirements demonstrate an equivalent level of safety for small UAS operations.

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

Pro Drones seeks an exemption from 14 C.F.R. § 91.7(a), which requires that a civil aircraft be in airworthy condition to be operated. The FAA has stated that no exemption is required to the extent that the requirements of Part 21 are waived or found inapplicable. Accordingly, Pro Drones requests that the requirements for Section 91.7 be treated in accordance with FAR Part 21 Subpart H. *See* Grant of Exemption No. 11062, p. 19.

F. 14 C.F.R. § 91.9(b)(2): Civil Aircraft Flight Manual in the Aircraft; 14 C.F.R. §§ 91.203(a) and (b): Carrying Civil Aircraft Certification and Registration

Pursuant to 14 C.F.R. § 91.9(b)(2):

> (b) No person may operate a U.S.-registered civil aircraft -

…

(2) For which an Airplane or Rotorcraft Flight Manual is 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.

Pursuant to 14 C.F.R. § 91.203(a) and (b):

(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.

Pro Drones does not request an exemption from this section but instead notifies the FAA that, in accordance with FAA Office of Chief Counsel's Opinion dated August 8, 2014, the UAS flight manual, registration certificate and other documentation will be kept at the control station with the PIC during flight. The Chief Counsel's Office has held that for all UAS operations, this alternate method constitutes full compliance with the regulations. *See also* Grant of Exemption No. 11062, pp. 19-20, and Grant of Exemption No. 8607.

G. 14 C.F.R. § 91.103: Preflight Action

Pro Drones seeks an exemption from 14 C.F.R. § 91.103, which requires a PIC to become familiar with specific information before each flight, including information contained in the FAA-approved Flight Manual on board the aircraft. The aircraft will not have a Flight Manual on board. The PIC will take all actions including reviewing weather, flight battery requirements, landing and takeoff distances and aircraft performance data before initiation of flight. Under these circumstances, the FAA has stated that no exemption is required. *See* Grant of Exemption No. 11062, p. 20. An exemption is requested to the extent that an FAA-approved Flight Manual is required.

Equivalent Level of Safety: An equivalent level of safety will be provided by following the Manuals. The PIC will take all required preflight actions - including performing all required checklists and reviewing weather, flight requirements, battery charge, landing and takeoff distance, aircraft performance data, and contingency landing areas - before initiation of flight. The Manuals will be kept at the ground station with the operator at all times.

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

Pro Drones seeks an exemption from 14 C.F.R. § 91.109(a), which provides that "[n]o 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." UASs and remotely piloted aircraft, by their design, do not have functional dual controls. Instead, flight control is accomplished through the use of the Ground Control System consisting of the handheld mdDRC command and control link and the laptop based data link that communicates with the aircraft via radio modem communications.

Equivalent Level of Safety: When flight instruction is performed, no pilots will be on the aircraft and the GCS will be a safe distance from the aircraft and the public, causing no safety hazard. Given the size and speed of the MD4-200, an equivalent level of safe training can still be performed without dual controls because no pilot or passengers are aboard the aircraft, and all persons will be a safe distance away in the event that the aircraft experiences any difficulties during flight instruction. In addition, Pro Drones will conduct flight training at a remote facility away from population centers. These training flights will comply with the provisions in the Manuals. Accordingly, Pro Drones' proposed method of operation provides superior levels of safety.

I. 14 C.F.R. § 91.119(c): Minimum Safe Altitudes in Uncongested Areas

Pro Drones requests an exemption from the minimum safe altitude requirements of 14 C.F.R. § 91.119(c). Section 91.119(c) prescribes that an aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure. The Manuals provide for operations away from congested population areas, but in close proximity to potential inspection sites and structures. The FAA has already determined that relief from Section 91.119(c) is warranted for UAS operations in uncongested areas with similar flight restrictions as those imposed by Pro Drones. *See* Grant of Exemption No. 11062, p. 20-21.

Equivalent Level of Safety: Compared to flight operations with rotorcraft/aircraft weighing far more than the maximum weights proposed herein, and given the lack of flammable fuel, any risk associated with these operations is far less than those that presently existing with conventional aircraft. An equivalent level of safety will be achieved given the size, weight, and speed of the MD4-200, as well as the locations where it is operated. In order to avoid any risk to aircraft, flight operations will be restricted to 400 feet AGL or below. This is airspace where other aircraft do not normally operate. As set forth in the Manuals and herein, the MD4-200 will be operated over land with the consent of the owner, away from persons or structures not involved in the operation. All persons who are not involved with Pro Drones' operations will be required to be at least 500 feet from flight operations.

J. 14 C.F.R. § 91.121: Altimeter Settings

This petition seeks an exemption from 14 C.F.R. § 91.121, which requires a person operating an aircraft to maintain cruising altitude or flight level by reference to an altimeter that is set to the elevation of the departure airport. As described above, the MD4-1000 is capable of maintaining altitude through pre-determined altitude settings.
Equivalent Level of Safety: The FAA has stated that an equivalent level of safety can be achieved if the aircraft will be operated at or below 400 feet AGL and within visual line-of-sight in addition to GPS based altitude information relayed in real time to the operator. *See* Grant of Exemption No. 11062, p. 20-21. As the attached Manuals indicate, the MD4-200 will be operated at or below 400 feet AGL and otherwise comply with the limitations in the Grant of Exemption No. 11062.

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

Pro Drones requests an exemption from 14 C.F.R. § 91.151(a)'s fuel requirements for flight in VFR conditions. Section 91.151 states:

> (a) No person may begin 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.

Here, the technological limitations on MD4-200 battery power means that no meaningful flight operations can be conducted while still maintaining a 30 minute reserve. The aircraft is battery powered with a maximum flight time of 35 minutes. Pro Drones proposes that the maximum flight time for each operational flight will be 70 minutes. The aircraft will be safely landed with no less than the greater of (a) 20% battery life remaining or (b) fifteen minutes of flight time remaining.

Equivalent Level of Safety: The FAA has stated that an equivalent level of safety is provided if the UAS flight is conducted under daytime VFR flight conditions using VLOS, and terminated with at least 25% reserve battery power still available. *See* Grant of Exemption No. 11062, p. 21-22. The Manuals providing an equivalent level of safety by safely landing with no less than the greater of (a) 20% battery life remaining or (b) seven minutes of flight time remaining and otherwise complying with the flight restrictions above.

L. 14 C.F.R. §§ 91.405(a), 91.407(a)(l), 91.409(a)(2); 91.417(a) and (b): Maintenance Inspections

Pro Drones seeks an exemption from the maintenance inspection requirements contained in 14 C.F.R. § 91.405(a), 91.407(a)(l), 91.409(a)(2); 91.417(a) and (b). These regulations specify maintenance and inspection standards in reference to 14 C.F.R. Part 43. *See*, *e.g.*, 14 C.F.R. § 91.405(a) (stating that each owner or operator of an aircraft "[s]hall have the aircraft inspected as prescribed in subpart E of this part and shall between required inspections ... have discrepancies repaired as prescribed in part 43 of this chapter"). An exemption from these regulations is needed because Part 43 and these sections only apply to aircraft with an airworthiness certificate, which the MD4-200 will not have.

Equivalent Level of Safety: An equivalent level of safety will be achieved because maintenance and inspections will be performed in accordance with the Manuals. This includes maintenance, overhaul, replacement, and inspection requirements for the aircraft and procedures to document and maintain maintenance records for the aircraft. This also includes preflight inspection procedures. *See* Exemption No. 11062, Docket No. FAA 2014-0352, at p. 14-15.

As provided in the Manuals, flights will not be conducted unless a flight operations checklist is performed that includes all of the aircraft's components. The Manuals also set requirements for maintenance logbooks and record keeping as well as routine and post-flight maintenance. The Manuals set requirements for both annual maintenance and preventative maintenance.

VII. PUBLIC INTEREST

Granting Pro Drones' petition for exemption furthers the public interest. National policy set by Congress favors early integration of UAS into the NAS in controlled, safe working environments. By granting this petition, the FAA will fulfill Congress's intent of allowing UAS to operate safely in the NAS before completion of the rulemaking required under Section 332 of the Reform Act.

Pro Drones' MD4-200 allows for safer and more thorough surveys and inspections of buildings, construction sites, pipelines, railways, etc. Such inspections and surveys traditionally required either manned aircraft or people surveying on foot.

The MD4-200 is a safer option than traditional manned aircraft. The MD4-200 is approximately 1.76 pounds, carries no passengers or crew and has no flammable fuel, as opposed to larger and more powerful helicopters and small airplanes. The public has an interest in reducing the hazards to human health and safety and property associated with such traditional manned aircraft for inspection operations. Moreover, an additional benefit is the

reduced emissions associated with the proposed UAS use, which addresses both environmental and human health imperatives.

The MD4-200 is also a safer and more efficient option than traditional foot surveys. Inspections on foot require a surveyor to climb aggregate piles with the risk of falling or navigate unsafe construction sites. The MD4-200 offers a much safer alternative at much less cost and for much better precision. The public has an interest in protecting its citizens from unsafe conditions during surveys and inspections, and an interest in having businesses conduct such inspections efficiently so that unnecessary costs are not passed on to consumers.

The MD4-200 also allows for safer agricultural surveying compared to manned aircraft and or higher precision surveying compared to satellite. Satellite imagery has much lower precision and is not "on demand." The MD4-200 will allow for high precision imagery and surveying of agricultural fields. Here too, the benefits to human health and safety and property obtain. But in addition to the environmental benefits of reduced emissions from traditional aircraft, the use of UAS can support more targeted applications of irrigation, herbicides, and fertilizers to agricultural lands, which also benefit the environment.

VIII. PRIVACY

All flights will occur over unpopulated areas, with the consent of the landowner. All flights will be conducted in accordance with any federal, state or local laws regarding privacy.

IX. SUMMARY FOR FEDERAL REGISTER

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:

Pro Drones seeks an exemption from the following rules for the commercial operation of a small unmanned aerial system: 14 C.F.R Part 21, Subpart H; 14 C.F.R Part 27; 14 C.F.R § 45.23(b); 14 C.F.R. § 45.27(a); 14 C.F.R § 61.113; 14 C.F.R § 91.7(a); 14 C.F.R § 91.9(b)(2); 14 C.F.R § 91.9(c); 14 C.F.R § 91.103; 14 C.F.R § 91.109(a); 14 C.F.R § 91.119; 14 C.F.R § 91.121; 14 C.F.R § 91.151(a) & (b) 14 C.F.R § 91.203 (a) & (b); 14 C.F.R § 91.405(a); 14 C.F.R § 91.407(a)(l); 14 C.F.R § 91.409(a)(2); 14 C.F.R § 91.417 (a) & (b).

The exemption will enhance safety by reducing risk to the operator, the general public and property owners from the substantial hazards associated with performing equivalent work using conventional aircraft and rotorcraft.

X. ATTACHMENTS

Attachment 1: Pro Drones MD4-200 Operations, Inspection, and Maintenance Manual

Attachment 2: Pro Drones MD4-200 Training/Experience Manual

Attachment 3: MD4-200 Operators Handbook

Attachment 4: Grant of Exemption to Astraeus Aerial, Docket No. FAA 2014-0352

Attachment 5: FAA Form 7711-UAS COA Attachment, 2014-ESA-111 –Certificate of Waiver of Authorization for Griffiss International Airport Test Site

Attachment 6: Special Flight Operations Certificate (SFOC) for MD4-200 issued by Transport Canada on September 12, 2014 for operations at unspecified locations in the Province of Ontario.

Attachment 7: Special Flight Operations Certificate (SFOC) for MD4-200 issued by Transport Canada on September 19, 2014 for operations across Alberta, Saskatchewan, Manitoba, Yukon, Northwest Territories and Nunavut.

Attachments 1-3 are confidential documents submitted under 14 C.F.R. § 11.35(b) and are exempt from disclosure under the Freedom of Information Act, 5 U.S.C. § 552 et seq., and any other requirements established by the FAA pursuant to Section 333 of the Reform Act). If you have any questions or require any additional information, please do not hesitate to contact the undersigned attorneys for Pro Drones.

XI. CONCLUSION

Satisfaction of the criteria provided in Section 333 of the Reform Act - size, weight, speed, operating capabilities, proximity to airports and populated areas, operation within visual line of sight, and national security considerations - provides more than adequate justification for the grant of the requested exemptions to permit Pro Drones to operate the MD4-200 for commercial purposes.

Granting the requested exemption will benefit the public interest as a whole in many ways, including (1) significantly improving safety and reducing risk by alleviating human exposure to danger; (2) improving the quality of services Pro Drones can provide to its customers; (3) decreasing operating costs related to survey and inspection activities; (4) reducing environmental impacts aerial surveys and inspections; and (5) supporting agricultural applications and treatments that reduce environmental impacts.

Sincerely,

William V. O'Connor
William D. Janicki
Joanna L. Simon
Morrison & Foerster LLP
12531 High Bluff Drive, Suite 100
San Diego, CA 92130-2040
Telephone: (858) 720-5100
Facsimile: (858) 720-5125
woconnor@mofo.com
wjanicki@mofo.com
joannasimon@mofo.com

Attachment 1

Submitted confidentially under 14 C.F.R § 11.35(b).
Exempt from disclosure under the Freedom of Information Act, 5 U.S.C § 552 *et seq*.

Attachment 2

Submitted confidentially under 14 C.F.R § 11.35(b).
Exempt from disclosure under the Freedom of Information Act, 5 U.S.C § 552 *et seq*.

Attachment 3

Submitted confidentially under 14 C.F.R § 11.35(b).
Exempt from disclosure under the Freedom of Information Act, 5 U.S.C § 552 *et seq*.

Attachment 4

Exemption No. 11062

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, DC 20591

In the matter of the petition of **ASTRAEUS AERIAL** for an exemption from part 21; §§ 45.23(b); 61.113(a) and (b); 91.7(a); 91.9(b)(2); 91.103; 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); and 91.417(a) and (b) of Title 14, Code of Federal Regulations	**Regulatory Docket No. FAA-2014-0352**

GRANT OF EXEMPTION

By letter dated May 27, 2014, Jonathan B. Hill, Cooley LLC, Counsel for Astraeus Aerial, and John McGraw, Aerospace Consulting, LLC, Agent for Astraeus Aerial, 1299 Pennsylvania Avenue, NW., Suite 700, Washington, DC 20004 petitioned the Federal Aviation Administration (FAA) on behalf of Astraeus Aerial (Astraeus) for an exemption from part 21, §§ 45.23(b), 61.113(a) and (b), 91.7(a), 91.9(b)(2), 91.103, 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), and 91.417(a) and (b) of Title 14, Code of Federal Regulations (14 CFR). The proposed exemption, if granted, would allow operation of unmanned aircraft systems (UAS) for the purpose of scripted, closed-set filming for the motion picture and television industry.

The petitioner requests relief from the following regulations:

> Part 21 prescribes, in pertinent part, the procedural requirements for issuing and changing design approvals, production approvals, airworthiness certificates, and airworthiness approvals.
>
> Section 45.23(b) prescribes, in pertinent part, that 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.

Section 61.113(a) and (b) prescribes that—

(a) no person who holds a private pilot certificate may act as a pilot in command of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as pilot in command of an aircraft.

(b) a private pilot may, for compensation or hire, act as pilot in command of an aircraft in connection with any business or employment if:

(1) The flight is only incidental to that business or employment; and

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

Section 91.7(a) prescribes, in pertinent part, that no person may operate a civil aircraft unless it is in an airworthy condition.

Section 91.9(b)(2) prohibits operation of U.S.-registered civil aircraft 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.

Section 91.103 prescribes, in pertinent part, that each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight, to include—

(a) For a flight under IFR or a flight not in the vicinity of an airport, weather reports and forecasts, fuel requirements, alternatives available if the planned flight cannot be completed, and any known traffic delays of which the pilot in command has been advised by ATC;

(b) For any flight, runway lengths at airports of intended use, and the following takeoff and landing distance information:

(1) For civil aircraft for which an approved Airplane or Rotorcraft Flight Manual containing takeoff and landing distance data is required, the takeoff and landing distance data contained therein; and

(2) For civil aircraft other than those specified in paragraph (b)(1) of this section, other reliable information appropriate to the aircraft, relating to aircraft performance under expected values of airport elevation and runway slope, aircraft gross weight, and wind and temperature.

Section 91.109 prescribes, in pertinent part, 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.

Section 91.119 prescribes that, except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

(a) Anywhere. An altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.

(b) Over congested areas. Over any congested area of a city, town, or settlement, or over any open air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

(c) Over other than congested areas. An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

(d) Helicopters, powered parachutes, and weight-shift-control aircraft. If the operation is conducted without hazard to persons or property on the surface—

(1) A helicopter may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section, provided each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA; and

(2) A powered parachute or weight-shift-control aircraft may be operated at less than the minimums prescribed in paragraph (c) of this section.

Section 91.121 requires, in pertinent part, 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.”

Section 91.151(a) prescribes that no person may begin 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. [emphasis added]

Section 91.203(a) prohibits, in pertinent part, any person from operating a civil aircraft unless it has within it (1) an appropriate and current airworthiness certificate; and (2) an effective U.S. registration certificate issued to its owner or, for operation within the United States, the second copy of the Aircraft Registration Application as provided for in § 47.31(c). Section 91.203(b) prescribes, in pertinent part, that no person may operate a civil aircraft unless the airworthiness certificate 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.

Section 91.405(a) requires, in pertinent part, that an aircraft operator or owner shall have that aircraft inspected as prescribed in subpart E of the same part and shall, between required inspections, except as provided in paragraph (c) of the same section, have discrepancies repaired as prescribed in part 43 of the chapter.

Section 91.407(a)(1) prohibits, in pertinent part, any person from operating an aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless it has been approved for return to service by a person authorized under § 43.7 of the same chapter.

Section 91.409(a)(2) prescribes, in pertinent part, that no person may operate an aircraft unless, within the preceding 12 calendar months, it has had an inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.

Section 91.417(a) and (b) prescribes, in pertinent part, that—

> (a) Each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:
>
> > (1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—
> >
> > (i) A description (or reference to data acceptable to the Administrator) of the work performed; and
> >
> > (ii) The date of completion of the work performed; and

(iii) The signature, and certificate number of the person approving the aircraft for return to service.

(2) Records containing the following information:

(i) The total time in service of the airframe, each engine, each propeller, and each rotor.

(ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.

(iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.

(iv) The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained.

(v) The current status of applicable airworthiness directives (AD) and safety directives including, for each, the method of compliance, the AD or safety directive number and revision date. If the AD or safety directive involves recurring action, the time and date when the next action is required.

(vi) Copies of the forms prescribed by § 43.9(d) of this chapter for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances.

(b) The owner or operator shall retain the following records for the periods prescribed:

(1) The records specified in paragraph (a)(1) of this section shall be retained until the work is repeated or superseded by other work or for 1 year after the work is performed.

(2) The records specified in paragraph (a)(2) of this section shall be retained and transferred with the aircraft at the time the aircraft is sold.

(3) A list of defects furnished to a registered owner or operator under § 43.11 of this chapter shall be retained until the defects are repaired and the aircraft is approved for return to service.

The petitioner supports its request with the following information:

The petitioner has provided the following information – contained in its petition and supplemental proprietary Flight Operations and Procedures Manual (hereafter FOPM) and Motion Picture and Television Operations Manual (hereafter MPTOM) – in support of its exemption request. The petitioner submitted additional information in response to the FAA's August 7, 2014 request which is posted to the docket. The FAA has organized the petitioner's information into three sections: 1) the unmanned aircraft system, 2) the UAS Pilot In Command (PIC), and 3) the UAS operating parameters.

Unmanned Aircraft System

The UAS proposed by the petitioner is a proprietary design, conceived and constructed by Astraeus Aerial, and referred to as the Astraeus Aerial Cinema System V.3CS UAS aircraft variant, serial #001 onward (hereafter referred to as V.3). This aircraft has eight rotors and eight motors in a quadcopter configuration (X8). The petitioner states that given the size, weight, speed, and limited operating area associated with the aircraft to be utilized by the applicant, an exemption from 14 CFR part 21, Subpart H (Airworthiness Certificates), subject to certain conditions and limitations, is warranted and meets the requirements for an equivalent level of safety under 14 CFR part 11 and Section 333 of the FAA Modernization and Reform Act of 2012 (PL 112-95). The petitioner further states that UAS operated without an airworthiness certificate in the restricted environment and under the conditions and limitations proposed by the petitioner will be at least as safe, or safer, than a conventional aircraft (fixed wing or rotorcraft) operating with an airworthiness certificate issued under 14 CFR part 21, Subpart H and not subject to the proposed conditions and limitations.

The petitioner states that the unmanned aircraft (UA) to be operated under this request is less than 55 lbs. fully loaded, flies at a speed of no more than 50 knots, 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 MPTOM. In addition, the petitioner has integrated safety features into the design of the UAS, as described in the petitioner's FOPM, to ensure the safety of persons and property within and surrounding the limited operating area. The petitioner further describes that, in the event the UAS loses communications or its GPS signal, the UA will have the capability to return to a pre-determined location within the Security Perimeter and land. It will also have the capability to abort a flight in the event of unpredicted obstacles or emergencies.

The petitioner states that even though its UAS will have no airworthiness certificate, an exemption may be needed from 14 CFR § 45.23 as the UA will have no entrance to the cabin, cockpit, or pilot station on which the word "experimental" can be placed. Given the size of the UA, the petitioner notes that the two-inch lettering will be impossible. The petitioner asserts that an equivalent level of safety will be provided by having the UA marked with the word "experimental" on the fuselage in compliance with 14 CFR § 45.29(f), in a location where the pilot, observer, and others working with the UA will see the identification.

The petitioner states that the maintenance requirements in the pertinent sections of 14 CFR part 91 are only applicable to aircraft with an airworthiness certificate in accordance with part 43. The petitioner states that its V.3 UAS does not have specific maintenance instructions; therefore the petitioner has developed and documented in its MPTOM and FOPM an "on-condition" maintenance process for the V.3 UAS affected by this exemption. The petitioner has also stated that it intends to follow any manufacturers' recommended instructions and procedures when those procedures exist for certain components of its V.3 UAS.

UAS Pilot In Command (PIC)

The petitioner asserts that since the UA will not carry a pilot or passengers on board, the proposed operations will not adversely affect safety by requiring the PIC operating the aircraft to have a private pilot's license rather than a commercial pilot's license. In support of its position, the petitioner argues that, since there are no standards for either private or commercial UAS pilot certificates, knowledge of airspace regulations and dexterity in the control and operation of the UAS acquired from actual operation of the aircraft will be the most important factors in establishing an equivalent level of safety. Furthermore, the petitioner explains that, given the restricted and controlled airspace within which operations will take place, the key factors needed by the PIC are knowledge of the airspace within which the "closed-set filming" operation will take place and how that airspace fits into the National Airspace System (NAS). The petitioner also states that it cannot be assumed that a commercial pilot, approved to operate a helicopter or fixed wing aircraft, has the skill or ability to safely operate an unmanned aerial vehicle, operating at 400 feet AGL or lower, within strictly controlled pre-approved airspace. The petitioner asserts that there are relatively few certificated pilots who are also qualified to fly the type of UAS utilized in motion picture industry image-capture operations. Astraeus further asserts that there are even fewer commercially certificated pilots that can fly these UAS, to the point that to do both is considered rare.

Additionally, the petitioner states that the aircraft will be operated within a secure environment, which no one will be allowed to enter unless they are part of the production, have been fully briefed of the risks prior to operation of the UAS, and have consented to the risks associated with being in the operating area. Should there be a mishap, the UA being flown pose significantly less of a threat than the helicopters and fixed wing aircraft now being employed because they are a fraction of the size, carry no flammable fuel, and do not carry crew or passengers. This is in stark contrast to conventional aircraft that are flown to the site, carry flammable fuel, carry passengers and crew, and operate in a much larger area.

UAS Operating Parameters

The petitioner states that all flights will be operated within visual line of sight (VLOS) of a pilot and/or observer, and that the UA flights will be limited to a maximum altitude of 400 feet AGL. The petitioner further states that an operator will ensure that only consenting production personnel will be allowed within 100 feet of the UA operation, but this radius may be reduced to 30 feet based upon an equivalent level of safety determination, as stated in their MPTOM, with the advance permission of the local Flight Standards District Office (FSDO). The petitioner asserts that an equivalent level of safety can be achieved given the size, weight,

and speed of the UAS, as well as the location where it is operated. The petitioner states that the UAS will be operated within a safe operating perimeter, the boundaries of which will be determined by production personnel and the UAS PIC based on the site-specific filming activities and speed of the UAS required for the operation, and coordinated with the jurisdictional FAA FSDO and local government officials as applicable, as outlined in the MPTOM and FOPM. The petitioner states that only participating and consenting production personnel will be allowed within this perimeter; the petitioner also states their intention to comply with the guidelines outlined in Order 8900.1 V3, C8, S1 with regard to nonparticipating personnel outside the safety perimeter. The petitioner argues that, compared to flight operations with aircraft or rotorcraft weighing far more than its maximum 55 lb. UA, and the lack of flammable fuel, any risk associated with its UAS operations is far less than those with conventional aircraft operating at or below 500 feet AGL in the movie industry.

With respect to preflight actions, the petitioner notes it may need an exemption from 14 CFR § 91.103, because it will not have approved rotorcraft flight manuals. The petitioner asserts that an equivalent level of safety will be achieved by the PIC taking all preflight actions as set forth in their MPTOM and FOPM, including reviewing weather, flight battery requirements, landing and takeoff distances, and aircraft performance data before initiation of flight. Additionally, the petitioner states that a briefing will be conducted prior to each day's filming regarding planned UAS operations, and all personnel who will be performing duties within the boundaries of the safety perimeter will be required to attend.

With respect to the fuel requirements, the petitioner notes that, in order to meet the 30 minute reserve requirements in 14 CFR § 91.151, UAS flights would have to be limited to approximately 10 minutes. The petitioner argues that, given the limitations on the UA's proposed flight area and the location of its proposed operations within a predetermined area, a longer time frame for flight in daylight or night VFR conditions is reasonable. The petitioner believes that an equivalent level of safety can be achieved by limiting flights to 30 minutes or 25% of battery power, whichever occurs first.

The petitioner notes that it may need an exemption from 14 CFR § 91.121, as its UAS may have a GPS altitude read out instead of a barometric altimeter. The petitioner asserts that an equivalent level of safety will be achieved, as outlined in its MPTOM. Specifically, the altitude information will be provided to the UAS PIC via a digitally encoded telemetric data feed. Prior to each flight, a zero altitude initiation point will be established and confirmed for accuracy by the PIC.

Public Interest

The petitioner states that, given the small size of the UA involved and the restricted sterile environment within which it will operate, its proposed operation "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 UAS to commence immediately." Also due to the size of the UA and the restricted areas in which the UAS will operate, approval of the application presents no national security issue. The petitioner states that, given the clear direction in Section 333, the strong equivalent level of safety surrounding the proposed operations, and the significant public benefit, including enhanced safety, reduction in

environmental impacts, and including reduced emissions associated with allowing UAS for movie and television operations, granting the requested exemptions is in the public interest.

Discussion of Public Comments:

A summary of the petition was published in the Federal Register on June 26, 2014 (79 FR 36378). Eighty-six comments were received.

Of the 86 comments received, including eight from associations, 50 comments supported the exemption request, 22 opposed, and 14 were neutral. The petition received comments on the following topics: economic impact, UAS, PIC, operational capabilities, airspace, privacy, sense and avoid, and data link.

Comments supporting the exemption request came from individuals and industry groups, including the Association of Unmanned Vehicle Systems International (AUVSI), Aerospace Industries Association (AIA), the National Association of Realtors, the News Media Coalition, and the National Press Photographers Association. Supporting comments cited the petitioner's intent to use controlled access airspace, licensed airmen, and preflight safety briefings, as well as the economic benefits of UAS.

Several trade organizations submitted letters to the docket, expressing various issues and concerns with the Astraeus petition for exemption, including the Air Line Pilots Association International (ALPA), the National Agricultural Aviation Association (NAAA), and the United States Hang Gliding and Paragliding Association (USHPA).

ALPA expressed concern regarding certain conditions outlined in Astraeus' petition. ALPA notes that the proposed operations will be for "compensation or hire," and ALPA believes that the pilot must hold at least a current FAA Commercial Pilot Certificate with an appropriate category and class rating for the type of aircraft being flown as well as specific and adequate training on the UAS make and model intended to be used. Similarly, a current 2nd Class FAA Medical certificate should be required for a UAS pilot operating an aircraft for compensation or hire commercial operations as is required in the NAS today. NAAA and USHPA also commented on pilot qualification. Specifically,

> NAAA believes that the Part 61 regulations currently in effect do not address the licensing of pilots of an unmanned aircraft used for commercial purposes. We believe it is necessary for the FAA to evaluate pilots of these aircraft on their knowledge and skills in UAV operations. Requirements for this licensing should be developed along with other rigorous rules and qualifications to ensure safe integration of the unmanned aircraft into the NAS.

The FAA has carefully reviewed the knowledge and training required by holders of both private and commercial certificates, as well as the separation of Astraeus' proposed operations from other manned operations. Additional details are available in the ensuing analysis of this issue with regards to 14 CFR § 61.113.

ALPA commented that although the anticipated operation is expected to occur below 400 feet above the surface, the petition also makes reference to operations 200 feet above structures of unspecified and therefore unlimited height. This would put the aircraft at the same altitude

strata as other aircraft in the NAS, with only geographic separation to mitigate the risk of collision. However, in subsequent materials posted to the docket, Astraeus has removed operation from elevated platforms. All operations will be limited to 400 feet AGL, which is specified in the conditions and limitations below.

ALPA further notes that the aircraft "may not have a barometric altimeter" so the ability to accurately maintain altitude must be addressed. NAAA noted the same in its comments. The FAA agrees with ALPA and NAAA and addresses this concern in its analysis of the exemption from 14 CFR § 91.121, finding that the alternative means of compliance proposed by Astraeus does not adversely affect safety.

ALPA and an individual comment that Command and Control (C2) link failures are one of the most common failures on a UAS, and that lost link mitigations should require safe modes to prevent fly-aways or other scenarios. The FAA agrees and carefully examined the proposed operation to ensure that the vehicle design and the petitioner's MPTOM and FOPM addressed potential hazards related to C2 failure. The FAA finds that the UAS to be operated by Astraeus has sufficient design features to address these hazards. The FAA also finds that the MPTOM and FOPM have incorporated safety procedures to be followed by all operational participants should a C2 failure occur. Further detail is contained in the analysis of the UAS below.

NAAA stated that it represents the interests of small business owners and pilots licensed as commercial applicators. NAAA members operate in low-level airspace, and clear low-level airspace is vital to the safety of these operators.

NAAA stated that seeing and avoiding other aircraft and hazardous obstructions is the backbone for agricultural safety, and agricultural pilots depend on pilots of other aircraft to perform their see and avoid functions needed to prevent collisions. NAAA believes that UA operations at low altitudes will increase the potential of collision hazards with agricultural aircraft. In its comments, the USHPA submitted similar concerns relative to activities of other low altitude user groups including ballooning, skydiving, powered ultralights, etc.

NAAA acknowledged Astraeus' plan to submit a written Plan of Activities to the FSDO three days before the proposed operations, as required by the petitioner's MPTOM. However, NAAA maintains, as does the USHPA, that in addition to this, issuance of a NOTAM advising nonparticipating pilots of the planned activity is vital to disseminating this safety information. The FAA agrees and has incorporated this into the conditions and limitations of this exemption. Further detail is contained in the analysis of the operating parameters below.

NAAA commented that UA should have assigned numbers that can be read from a suitable distance to aid in identification when enforcement of flight regulations is required. The USHPA commented similarly, noting that while the current identification standards are not feasible on small UA given their reduced size, identification appropriate for these design parameters could be defined and created without undue burden or negative impacts on UAS operations. The FAA partially agrees with NAAA and USHPA. UA operated under this exemption will be marked in accordance with 14 CFR part 45 or as otherwise authorized by the FAA. Further detail is contained in the analysis of the UAS below.

USHPA states that it is a nonprofit member organization with the specific and primary purpose to engage exclusively for scientific and educational purposes in the development, study, and use of fuel-less flight systems and aircraft capable of being launched by human power alone. USHPA commented that it believes with proper notification of time and place, along with other considerations, safety can be maintained. USHPA's notification concerns will be addressed by the conditions and limitations that will require an Air Traffic Organization issued Certificate of Waiver or Authorization (COA) to address airspace requirements and notification. Further detail is contained in the analysis of the UAS operating parameters below.

Related to the operation of the UA within visual line of sight (VLOS) of the pilot and/or observer, USHPA believes operation of any UA in three-dimensional space presents unique challenges in accurately determining position in relation to stationary or mobile objects. USHPA comments that utilization of an observer for operational redundancy is prudent and encouraged, but should not be considered a viable replacement for the pilot in command. USHPA believes that the identification of navigational requirements and accurately conveying them to the pilot in command would not be provided with adequate precision or sufficient response time in a crisis situation and recommends that dual control systems be utilized as a redundant safety measure common in commercial aviation environments. The FAA notes USHPA's concerns; additional detail is provided in the analysis of the UAS below.

USHPA also asserts that manned flight should always maintain right of way over all UA operations. The FAA agrees and has incorporated this into the conditions and limitations of this exemption.

Several comments noted that small UAS can be hard to see during the day, due to their small size and factors such as sun glare. Commenters also noted concerns with regard to weather and wind conditions affecting operations. The FAA addressed these concerns by adding operating restrictions in the conditions and limitations regarding stand-off distance from clouds, altitude restrictions, and operating distance from non-participating personnel. Further detail is contained in the analysis of the UAS operating parameters below.

The petition received several comments suggesting that UAS operated under this exemption should have the ability to monitor and communicate with other aircraft or install transponders, or that the UAS should not operate until they can sense and avoid other aircraft. One commenter suggested that the FAA should implement a buffer between these UAS operations and manned operations, while another raised concern with near misses with other aircraft. Two comments noted that UAS are susceptible to accidents and GPS jamming. The FAA believes the limitations under which the petitioner will operate (i.e. VLOS and at or below 400 feet AGL) and the UAS emergency procedures as outlined in the petitioner's FOPM and MPTOM are sufficient mitigations to this risk so that the operations will not adversely affect safety. Further information is contained in the analysis of the UAS below.

One commenter suggested that the FAA should require testing of software and systems prior to operation, including testing to RTCA standards. The FAA believes the preflight checks discussed in the analysis of the UAS operating parameters are sufficient to mitigate this risk, and addresses this in the conditions and limitations below.

The FAA also received comments not related to the UA and its operation as proposed by the petitioner, but rather addressing more general UAS issues, which are discussed below.

The FAA received two comments asking how the FAA plans to monitor or conduct surveillance of the petitioner's UAS operations. The FAA expects operators to comply with its regulations and the terms of the exemption. The jurisdictional FSDO will be the primary office responsible for oversight of the operations.

The FAA received several comments that integrating UAS operations via a broadly applicable rule was a more suitable method than the exemption process, and that industries other than the motion picture industry should be allowed to participate. Section 333 provides interim authority to the Secretary of Transportation, which facilitates limited, controlled UAS operations prior to the completion of a UAS regulatory structure. The FAA is using its exemption process to facilitate implementation of Section 333 and to address FAA rules that would be applicable to the proposed operations. We have received and are considering exemption petitions from a broad array of industries and applications for this technology. Additionally, the FAA is engaged in a rulemaking process that will allow broader applications of UAS operations.

Two commenters suggested this exemption process should be available to anybody, regardless of organizational size or resources. The FAA will consider any request for exemption submitted to it, no matter the source.

One commenter stated that meaningful public review of the petition was not possible because some of the documents submitted by the petitioner are confidential. The FAA routinely considers confidential materials in its exemption process. The FAA reviewed and considered the petitioner's information in its analysis of the petition.

The petition received several comments on privacy. A commenter expressed concern that the UAS could be used for spying. Other commenters stated that there are strong privacy regulations in place. Specifically, a commenter states that the petitioner addressed privacy issues in its request by mandating that all filming be within a contained environment with all participants fully aware that they are being filmed. The petitioner states that all UAS flights will occur over private or controlled access property with the property owner's prior consent and knowledge, and that only people who have consented or otherwise have agreed to be in the area where filming will take place will be filmed. The FAA notes that the terms of this grant of exemption are consistent with the petitioner's proposal in this area.

The FAA's analysis is as follows:

Unmanned aircraft system (UAS)

Regarding the petitioner's requested relief from 14 CFR part 21 Certification procedures for products and parts, the FAA finds that, based on the limited size, weight, operating conditions, design safety features, and the imposed conditions and limitations, the petitioner has demonstrated that its operations would not adversely affect safety compared to similar

operations conducted with aircraft that have been issued an airworthiness certificate under 14 CFR part 21, Subpart H.

Commercial motion picture and television aerial filming operations with manned aircraft are typically conducted with aircraft holding standard airworthiness certificates issued under part 21, subpart H. These aircraft are normally modified via the Supplemental Type Certificate (STC) process to install cameras and other equipment not included in the original aircraft design.

Manned helicopters conducting motion picture and television aerial filming can weigh 6,000 lbs. or more and are operated by an onboard pilot, in addition to other onboard crewmembers, as necessary. The petitioner's UA will weigh less than 55 lbs. with no onboard pilot or crew. The pilot and crew will be remotely located from the aircraft. The limited weight significantly reduces the potential for harm to participating and nonparticipating individuals or property in the event of an incident or accident. The risk to an onboard pilot and crew during an incident or accident is eliminated with the use of a UA for the aerial filming operation.

Manned aircraft are at risk of fuel spillage and fire in the event of an incident or accident. The UA carries no fuel, and therefore the risk of fire following an incident or accident due to fuel spillage is eliminated.

During motion picture and television aerial filming with manned aircraft under the conditions of an FAA issued Certificate of Waiver, aircraft can be operated in very close proximity to participating persons. The safety of these individuals is maintained through use of an aircraft with standard airworthiness certification under 14 CFR part 21, Subpart H, operation of the aircraft by a qualified and competent pilot, and operating according to limitations necessary to ensure safety. In these situations, the filming subject and production personnel are exposed to risk by virtue of their close proximity to an aircraft in flight. Compared to manned aircraft, the UA being operated by the petitioner reduces the risk to participating persons in close proximity to the aircraft due to the limited size, weight, operating conditions, and design safety features of the UAS.

This exemption does not require an electronic means to monitor and communicate with other aircraft, such as transponders or sense and avoid technology. Rather the FAA is mitigating the risk of these operations by placing limits on altitude, requiring stand-off distance from clouds, permitting daytime operations only, and requiring that the UA be operated within visual line of sight and yield right of way to all other manned operations. Additionally, the exemption provides that the operator will request a NOTAM prior to operations to alert other users of the NAS.

The petitioner's UAS has the capability to operate safely after experiencing certain in-flight failures. The UA is also able to respond to a lost-link event with a pre-coordinated, predictable, automated flight maneuver. With regard to USHPA's concerns about dual control systems, current FAA regulations permit motion picture and television filming operations by manned aircraft that do not require a copilot. Additionally, under this exemption, the FAA requires that the UAS PIC hold a current third class medical certificate. Historically, instances of complete PIC incapacitation are rare. In all other cases other than complete incapacitation,

the PIC has the ability to terminate the flight operation or initiate the automated return to home procedure outlined within the FOPM. The FAA also believes that the multiple control redundancies described in the petitioner's FOPM are sufficient to mitigate risks associated with the loss of GPS signal. In consideration of these factors and the UA size, weight, speed and other operating limitations associated with this aerial filmmaking operation, the FAA finds that there is no adverse safety affect relative to similar operations conducted by manned aircraft with a flight crew complement of one.

These safety features also provide for no adverse safety affect to participating and nonparticipating individuals compared to a manned aircraft that holds a standard airworthiness certificate performing a similar operation.

In accordance with the statutory criteria provided in Section 333 of PL 112-95 in reference to 49 USC 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, and any associated noise certification and testing requirements of part 36, is not necessary.

Regarding the petitioner's requested relief from 14 CFR § 45.23(b) Display of marks, the petitioner's request is made under the assumption that marking with the word "experimental" will be required as a condition of an exemption request. This marking is reserved for aircraft that are issued experimental certificates under § 21.191. Since the petitioner's UAS will not be certificated under 14 CFR § 21.191, a grant of exemption for 14 CFR § 45.23(b) is not necessary.

The petitioner's UA 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.

Regarding the petitioner's requested relief from 14 CFR §§ 91.405(a) Maintenance required, 91.407(a)(1) Operation after maintenance, preventive maintenance, rebuilding, or alteration, 91.409(a)(2) Inspections, and 91.417(a) and (b) Maintenance records, the FAA has determined that relief from 91.409(a)(1) is also necessary, because it is an alternate inspection requirement of 91.409(a)(2).

The petitioner's FOPM contains the maintenance requirements for the V.3 UAS, to include "on-condition" maintenance and modifications. The petitioner's MPTOM and FOPM were reviewed and do not sufficiently support the regulatory relief sought under 14 CFR part 91, Subpart E. The FAA has carefully considered the petitioner's supplemental information and determined that its operations will not adversely affect safety with regard to the regulatory maintenance and alteration requirements of 14 CFR §§ 91.405(a)(1), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), provided changes are made to the MPTOM and FOPM as required by the conditions and limitations included in this exemption. These changes include: requirements to develop and document maintenance, overhaul, replacement, and inspection requirements in the absence of manufacturer's requirements; procedures to document and maintain maintenance records with regard to the petitioner's UAS; and UAS

technician qualification criteria. They also require the petitioner's FOPM to include preflight inspection procedures that account for any discrepancies not already covered in the manual. The FAA finds these additional requirements are necessary to ensure the petitioner's proposed UAS operations do not adversely affect safety in the NAS and of people and property on the ground. Therefore, the FAA finds that exemption from 14 CFR §§ 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b) is warranted subject to the conditions and limitations below.

Pilot In Command of the UAS

Regarding the petitioner's requested relief from 14 CFR § 61.113(a) and (b) Private pilot privileges and limitations, comments were received that voiced concerns about pilot certification. One such comment came from ALPA, which states that one of the "areas that must be addressed to ensure safe operations" is Astraeus' proposal to use a private pilot with a third class medical as its UAS PIC. ALPA believes that the UAS pilot should possess a commercial pilot certificate with appropriate category and class rating for the type of aircraft being flown and the corresponding second class medical certificate, as well as specific and adequate training on the UAS make and model intended to be used. Similar concerns were also raised by other associations such as USHPA and NAAA.

Given these grounds, the FAA must determine the appropriate level of pilot certification for Astraeus' proposed operation. Title 14 CFR part 61 requires that operations conducted for compensation or hire necessitate a commercial pilot certificate and at least a second class medical certificate. In considering the petitioner's requested relief from 14 CFR § 61.113(a) and (b), the FAA must consider the following factors as they relate specifically to Astraeus' proposed operations:

Separation from manned aircraft operations: Astraeus proposes operations in a "sterile environment" of closed-set motion-picture filming. In this controlled environment, their operations will remain within visual line of site (VLOS) and below 400 feet AGL. Additionally, the FAA has added further conditions and limitations that will require a Certificate of Waiver or Authorization (COA) from the FAA Air Traffic Organization to address airspace requirements and notification requiring Astraeus to request a Notice to Airman (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to the operation. Astraeus will also be required to avoid and yield right-of-way to all manned operations.

The current aeronautical knowledge requirements for a private pilot compared to a commercial pilot: The FAA analyzed the areas of knowledge specified in 14 CFR part 61 for that of a commercial pilot versus a private pilot. The results show that the required areas of knowledge for a commercial versus private pilot cover the same fundamental principles, as shown in the following table.

Commercial Knowledge	Private Knowledge
****Airplane Single Engine Land (ASEL) used for comparison****	
§ 61.125 Aeronautical knowledge. *(a) General.* A person who applies for a commercial pilot certificate must receive and log ground training…	**§ 61.105 Aeronautical knowledge.** *(a) General.* A person who is applying for a private pilot certificate must receive and log ground training…
(b) **Aeronautical knowledge areas.**	(b) **Aeronautical knowledge areas.**
(1) Applicable Federal Aviation Regulations of this chapter that relate to commercial pilot privileges, limitations, and flight operations;	(1) Applicable Federal Aviation Regulations of this chapter that relate to private pilot privileges, limitations, and flight operations;
(2) Accident reporting requirements of the National Transportation Safety Board;	(2) Accident reporting requirements of the National Transportation Safety Board;
(3) Basic aerodynamics and the principles of flight;	(10) Principles of aerodynamics, powerplants, and aircraft systems;
(4) Meteorology to include recognition of critical weather situations, windshear recognition and avoidance, and the use of aeronautical weather reports and forecasts;	(6) Recognition of critical weather situations from the ground and in flight, windshear avoidance, and the procurement and use of aeronautical weather reports and forecasts;
(5) Safe and efficient operation of aircraft;	(7) Safe and efficient operation of aircraft, including collision avoidance, and recognition and avoidance of wake turbulence;
(6) Weight and balance computations;	(9) Weight and balance computations;
(7) Use of performance charts;	(8) Effects of density altitude on takeoff and climb performance;
(8) Significance and effects of exceeding aircraft performance limitations;	**Related to other areas within the private requirements but not referenced specifically**
(9) Use of aeronautical charts and a magnetic compass for pilotage and dead reckoning;	(4) Use of aeronautical charts for VFR navigation using pilotage, dead reckoning, and navigation systems;
(10) Use of air navigation facilities;	(4) Use of aeronautical charts for VFR navigation using pilotage, dead reckoning**, <u>and navigation systems</u>**; (5) Radio communication procedures;
(11) Aeronautical decision making and judgment;	(12) Aeronautical decision making and judgment; and
(12) Principles and functions of aircraft systems;	(10) Principles of aerodynamics, powerplants, and aircraft systems;
(13) Maneuvers, procedures, and emergency operations appropriate to the aircraft;	(7) Safe and efficient operation of aircraft, including collision avoidance, and recognition and avoidance of wake turbulence; (11) Stall awareness, spin entry, spins, and spin recovery techniques for the airplane and glider category ratings;
(14) Night and high-altitude operations; **	**Although not mentioned in § 61.105, 3 hours of night flight training is required for the private per § 61.107 and § 61.109. For this comparison, high-altitude operations are considered not applicable.**
(15) Procedures for operating within the National Airspace System; and	(3) Use of the applicable portions of the "Aeronautical Information Manual" and FAA advisory circulars; (13) Preflight action that includes— (i) How to obtain information on runway lengths at airports of intended

	use, data on takeoff and landing distances, weather reports and forecasts, and fuel requirements; and (ii) How to plan for alternatives if the planned flight cannot be completed or delays are encountered.
(16) Procedures for flight and ground training for lighter-than-air ratings.**	**For this comparison (ASEL), these operations are considered not applicable.**
§ 61.127 Flight proficiency. (a) *General.* A person who applies for a commercial pilot certificate must receive and log **ground** and flight training	**§ 61.107 Flight proficiency.** (a) *General.* A person who applies for a private pilot certificate must receive and log **ground** and flight training
(b) *Areas of operation.* (1) For an airplane category rating with a single-engine class rating:	(b) *Areas of operation.* (1) For an airplane category rating with a single-engine class rating:
(i) Preflight preparation;	(i) Preflight preparation;
(ii) Preflight procedures;	(ii) Preflight procedures;
(iii) Airport and seaplane base operations;	(iii) Airport and seaplane base operations;
(iv) Takeoffs, landings, and go-arounds;	(iv) Takeoffs, landings, and go-arounds;
(v) Performance maneuvers;	(v) Performance maneuvers;
(vi) Ground reference maneuvers;	(vi) Ground reference maneuvers;
(vii) Navigation;	(vii) Navigation;
(viii) Slow flight and stalls;	(viii) Slow flight and stalls;
(ix) Emergency operations;	(x) Emergency operations;
(x) High-altitude operations; and	**For this comparison, high-altitude operations are considered not applicable.**
(xi) Postflight procedures.	(xii) Postflight procedures.
Not referenced specifically	(ix) Basic instrument maneuvers;
Not referenced specifically	(xi) Night operations, except as provided in §61.110 of this part; and

The specific UAS airmanship skills required for Astraeus' PIC(s): Some of the requirements for Astraeus' PIC(s) are provided in their proprietary documents. However, as with other exemptions that contain specific pilot qualifications, e.g. Exemption Nos. 7830, 6802K, and 6540N, those pilot requirements become conditions and limitations within the grant of exemption. An abbreviated summary of those PIC requirements include the following:

a. The PIC must possess a Private Pilot's Certificate and a valid third-class medical certificate;

b. The PIC must have accumulated and logged a minimum of 200 flight cycles and 25 hours of total time as a UAS rotorcraft pilot and at least 10 hours logged as a UAS pilot with a similar UAS type (single blade or multirotor).

c. The PIC must have accumulated and logged a minimum of five hours as UAS pilot with the make and model of UAS to be utilized for operations under the exemption and three take-offs and landings in the preceding 90 days.

d. The PIC must have successfully completed the qualification process as specified in the MPTOM and FOPM, to include a knowledge and skill test.

The FAA's analysis regarding PIC requirements: The parallel foundation of aeronautical knowledge required for private and commercial pilots is shown in the above table. Private

pilot airmanship skills are furthered through manned flights in the NAS. Commercially certificated pilots build additional experience through these manned flights as well. The additional experience and airmanship skills obtained by commercially certificated airmen contribute to their ability to overcome adverse situations that could be encountered in flights conducted for compensation or hire. However, the experience obtained beyond a private pilot certificate in pursuit of a commercial pilot certificate in manned flight does not necessarily aid a pilot in the operational environment proposed by the petitioner; the FAA considers the overriding safety factor for the limited operations proposed by the petitioner to be the airmanship skills acquired through UAS-specific flight cycles, flight time, and specific make and model experience, culminating in verification through testing.

The FAA shares ALPA's concerns regarding appropriate training on the UAS being utilized. The FAA has reviewed the petitioner's knowledge and experience criteria for its PICs. The FAA finds that the combination of aeronautical knowledge, UAS airmanship skills, and verification through testing is a sufficient method for Astraeus to evaluate a pilot's qualifications, given that operations will be conducted within the limitations outlined in this exemption.

The knowledge and airmanship test qualifications have been developed by Astraeus for the UAS operations proposed in their petition for exemption. There are no established practical test standards that support a jurisdictional FAA FSDO evaluation and approval of company designated examiners. The petitioner will conduct these tests in accordance with its FOPM and the conditions and limitations noted below. Given the constraints of the proposed operations, the FAA believes this would not adversely affect the safety of the NAS.

The petitioner plans to operate in a unique and limited environment. Given the 1) separation of these closed-set filming operations from other manned operations, 2) the parallel nature of private pilot aeronautical knowledge requirements to those of commercial requirements, and 3) the UAS airmanship skills of Astraeus' PICs, the FAA finds that the additional manned airmanship experience of a commercially certificated pilot would not correlate to the airmanship skills necessary for Astraeus' specific proposed operations. Upon consideration of the overall safety case presented by the petitioner and the concerns of the commenters, the FAA finds that granting the requested relief from 14 CFR § 61.113(a) and (b), provided the conditions and limitations outlined below, would not adversely affect the safety of the NAS.

Another consideration supporting the certificate requirement is that pilots holding a private pilot certificate are subject to security screening by the Department of Homeland Security. This requirement should ameliorate security concerns over UAS operations under this exemption.

Operating parameters of the UAS

Astraeus has stated that it plans to comply with the waiver process as described in FAA Order 8900.1, Volume 3, Chapter 8, Section 1 (V3, C8, S1) Issue a Certificate of Waiver for Motion Picture and Television Filming. The FAA agrees with this philosophy; however, the current section of Order 8900.1 has specific processes that preclude a jurisdictional FAA FSDO from issuing the required Certificate of Waiver, because the section did not originally provide for

UA operations. One example of this is the minimum pilot qualifications – the pertinent section of Order 8900.1 provides no way to relieve Astraeus from the pilot requirements. Also, the sample form 7711-1 used for issuing the Certificate of Waiver specifically states "this section not used for Unmanned Air Vehicle authorizations."

Therefore, the FAA will exempt Astraeus from the applicable regulations normally waived during that process. The FAA will then include the required notifications and coordination with jurisdictional FSDOs through the conditions and limitations listed below. Motion picture and television filming waivers similar to Astraeus' operation are normally issued from one jurisdictional FSDO and can be used in locations covered by other geographically responsible FSDOs through notification. Those local FSDOs then have the ability to review the proposed plan of activities and associated operations manual(s) and levy any additional local special provisions. Since Astraeus' operation deals specifically with UAS, this exemption will take the place of the Certificate of Waiver normally issued by a jurisdictional FSDO under 8900.1 V3, C8, S1. Every FSDO with jurisdiction over the area that Astraeus plans to operate within must still be notified, just as with manned filming operations, and those FSDOs will have the ability to coordinate further conditions and limitations with the UAS Integration Office to address any local concerns, as stated below in the conditions and limitations section of this exemption.

The petitioner must also obtain a Certificate of Waiver or Authorization (COA) from the FAA's Air Traffic Organization (ATO) prior to conducting any operations. This is an existing process that not only makes local Air Traffic Control (ATC) facilities aware of UAS operations, but also provides ATO the ability to consider airspace issues that are unique to UAS operations. The COA will require the operator to request a Notice to Airman (NOTAM), which is the mechanism for alerting other users of the NAS to the UAS activities being conducted. Therefore, the FAA believes that adherence to this process is the safest and most expeditious way to permit Astraeus to conduct their proposed UAS operations. The conditions and limitations below prescribe the requirement for Astraeus to obtain an ATO-issued COA.

Regarding the petitioner's requested relief from 14 CFR § 91.7(a) Civil Aircraft Airworthiness, Astraeus' request is based on the fact that no airworthiness certificate will be issued for the UAS. As previously noted, the petitioner's UAS will not require an airworthiness certificate in accordance with 14 CFR part 21, Subpart H. Based on the fact that an airworthiness certificate will not be issued, exemption from § 91.7(a) is not necessary.

In accordance with the pertinent part of 14 CFR § 91.7(b), the PIC of the UAS is responsible for determining whether the aircraft is in condition for safe flight. The petitioner's manuals for maintenance and operations include safety checklists to be used prior to each flight.

Regarding the petitioner's requested relief from 14 CFR § 91.9(b)(2) Civil aircraft flight manual, marking, and placard requirements and § 91.203(a) and (b) Civil aircraft: Certifications required, the original intent of these regulations was to display an aircraft's airworthiness, certification, and registration documents so they would be easily available to inspectors and passengers. Based on the FAA Memorandum subject "Interpretation regarding whether certain required documents may be kept at an unmanned aircraft's control station,"

dated August 8, 2014, the requested relief from 14 CFR §§ 91.9(b)(2) and 91.203(a) and (b) is not necessary.

Regarding the petitioner's requested relief from 14 CFR § 91.103 Preflight action, although there will be no approved Airplane or Rotorcraft Flight Manual as specified in paragraph (b)(1), the FAA believes that the petitioner can comply with the other applicable requirements in 14 CFR § 91.103(b)(2). The procedures outlined in the petitioner's MPTOM and FOPM address the FAA's concerns regarding compliance with § 91.103(b). The petitioner has also stated its intent to comply with § 91.103(a): "The PIC will take all actions including reviewing weather, flight battery requirements, landing and takeoff distances and aircraft performance data before initiation of flight." The FAA has imposed stricter requirements with regard to visibility and distance from clouds; this is to both keep the UA from departing VLOS and to preclude the UA from operating so close to a cloud as to create a hazard to other aircraft operating in the NAS. The FAA also notes the risks associated with sun glare; the FAA believes that the PIC's and VO's ability to still see other air traffic, combined with the PIC's ability to initiate a return-to-home sequence, are sufficient mitigations in this respect. The PIC will also account for all relevant site-specific conditions in their preflight procedures. Therefore, the FAA finds that exemption from 14 CFR § 91.103 is not necessary.

Regarding the petitioner's requested relief from 14 CFR § 91.109 Flight instruction; Simulated instrument flight and certain flight tests, the petitioner did not describe training scenarios in which a dual set of controls would be utilized or required, i.e. dual flight instruction, provided by a flight instructor or other company-designated individual, that would require that individual to have fully functioning dual controls. Rather, Astraeus evaluates the qualification of its PICs based on their experience with the UAS to be operated and verifies through testing, in lieu of formalized training. As such, the FAA finds that the petitioner can conduct its operations without the requested relief from 14 CFR § 91.109.

Regarding the petitioner's requested relief from 14 CFR § 91.119 Minimum safe altitudes, the petitioner failed to specify the pertinent part of 14 CFR § 91.119 from which they require relief. Relief from 14 CFR § 91.119(a) , which requires operating at an altitude that allows a safe emergency landing if a power unit fails, is unprecedented and unwarranted. Relief from § 14 CFR 91.119(b), operation over congested areas, is not applicable, because the petitioner states that operations will only be conducted within the sterile area described in the MPTOM.

Although the petitioner specifically mentioned relief from 14 CFR § 91.119(d), the FAA finds that relief is only needed from 14 CFR § 91.119(c), which is consistent with the relief typically provided to manned operations in FAA Order 8900.1 V3, C8, S1 Issue a Certificate of Waiver for Motion Picture and Television Filming. This Order allows for relief from § 91.119(c) with respect to those participating persons, vehicles, and structures directly involved in the performance of the actual filming. In accordance with the petitioner's stated intention to adhere to Order 8900.1 V3, C8, S1, persons other than participating persons[1] are not allowed

[1] Per Order 8900.1 V3, C8, S1, participating persons are all persons associated with the filming production, and they must be briefed on the potential risk of the proposed flight operation(s) and must acknowledge and accept those risks. Nonparticipating persons are the public, spectators, media, etc., not associated with the filming production.

within 500 feet of the operating area. This provision may be reduced to no less than 200 feet if an equivalent level of safety can be achieved and the Administrator has approved it. For example, an equivalent level of safety may be determined through evaluation by an aviation safety inspector of the filming production area to note terrain features, obstructions, buildings, etc. Such barriers may protect nonparticipating persons (observers, the public, news media, etc.) from debris in the event of an accident.

The FAA notes the petitioner's additional guidelines in its MPTOM to protect its participating production personnel, and finds that relief from 14 CFR § 91.119(c) is warranted, provided adherence to the procedures outlined in the petitioner's MPTOM and FOPM, and the FAA's additional conditions and limitations outlined below. However, all nonparticipating personnel will be required to be at least 500 feet from flight operations, with possible relief to allow reductions to 200 feet, as specified above.

Regarding the petitioner's requested relief from 14 CFR § 91.121 *Altimeter Settings*, the FAA believes that an altitude reading is a critical safety component of the petitioner's proposed operation. Although the petitioner will not have a typical barometric altimeter onboard the aircraft, the FAA finds the petitioner's intention to operate the UA within VLOS and at or below 400 feet AGL, combined with the petitioner's intention to provide altitude information to the UAS pilot via a digitally encoded telemetric data feed, which downlinks from the aircraft to a ground-based on-screen display, to be a sufficient method for ensuring the UAS operations do not adversely affect safety. The altitude information will be generated by equipment installed onboard the aircraft, as specified using GPS triangulation, or digitally encoded barometric altimeter, or radio altimeter, or any combination thereof. Prior to each flight, a zero altitude initiation point will be established and confirmed for accuracy by the UAS PIC. The FAA has determined that good cause exists for granting the requested relief to 14 CFR § 91.121.

Regarding the petitioner's requested relief from 14 CFR § 91.151(a) Fuel requirements for flight in VFR conditions, relief has been granted for manned aircraft to operate at less than the minimums prescribed in 14 CFR § 91.151(a), including Exemption Nos. 2689, 5745, and 10650. In addition, similar UAS-specific relief has been granted in Exemption Nos. 8811, 10808, and 10673 for daytime, Visual Flight Rules (VFR) conditions. The petitioner states that its UAS operations will be conducted in a controlled closed-set filming environment, with UA under 55 pounds, at speeds below 50 Knots, and within VLOS. These factors, combined with Astraeus' stated intention to terminate flights after 30 minutes or with 25% remaining battery power (whichever occurs first), provides the FAA sufficient reason to grant the relief from 14 CFR § 91.151(a) as requested in accordance with the conditions and limitations proposed by Astraeus.

With respect to the petitioner's request to operate at night, the FAA finds that the petitioner has not provided a sufficient safety case and mitigations, per FAA Order 8900.1 V16, C5, S3 General Operational Requirements, to avoid collision hazards at night. All previous UAS-specific grants of relief from 14 CFR § 91.151(a) have restricted flights to daytime VFR conditions only. While the FAA acknowledges the petitioner's stated film set lighting techniques to mitigate the risks of nighttime operations, the petitioner has not provided

sufficient data and analysis regarding the PICs' and VOs' ability to maintain VLOS with the UA and conduct their functions to see and avoid other potential obstacles and air traffic, relative to the lighting configuration on the film set. There is a limitation outlined below that precludes nighttime UAS operations. The petitioner may provide additional data and seek an amendment to its exemption to permit night operations.

Additionally, in evaluating the petitioner's proposed operating parameters with regard to VLOS and a safe operating perimeter, the FAA considered operations from a moving device or vehicle. Since the petitioner did not discuss provisions for these circumstances, the conditions and limitations below preclude operations from moving devices or vehicles.

Public Interest

The FAA finds that a grant of exemption is in the public interest. The enhanced safety achieved using a 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. The FAA also finds that UAS provide an additional tool for the filmmaking industry, adding a greater degree of flexibility, which supplements the current capabilities offered by manned aircraft.

The table below summarizes the FAA's determinations regarding the relief sought by the petitioner:

Relief sought by petitioner (14 CFR)	**FAA determination (14 CFR)**
Part 21	Not necessary
45.23(b)	Not necessary
61.113(a) and (b)	Granted with conditions and limitations
91.7(a)	Not necessary
91.9(b)(2)	Not necessary
91.103	Not necessary with conditions and limitations
91.109	Not necessary
91.119	Paragraph (c) granted with conditions and limitations
91.121	Granted with conditions and limitations
91.151(a)	91.151(a)(1), day, granted with conditions and limitations; 91.151(a)(2), night, denied
91.203(a) and (b)	Not necessary
91.405(a)	Granted with conditions and limitations
91.407(a)(1)	Granted with conditions and limitations

91.409(a)(2)	Granted with conditions and limitations; relief from 91.409(a)(1) also granted with conditions and limitations
91.417(a) and (b)	Granted with conditions and limitations

The FAA's 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, Astraeus Aerial is granted an exemption from 14 CFR §§ 61.113(a) and (b); 91.119(c); 91.121; 91.151(a); 91.405(a); 91.407(a)(1); 91.409(a)(1) and (2); and 91.417(a) and (b) to the extent necessary to allow Astraeus to operate unmanned aircraft systems (UAS) for the purpose of scripted, closed-set filming for the motion picture and television industry. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

Relative to this grant of exemption, Astraeus is hereafter referred to as the operator.

The Flight Operations and Procedures Manual (FOPM) and Motion Picture and Television Operations Manual (MPTOM) are hereafter collectively referred to as the operator's manual.

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.

The operator proposed the following conditions and/or limitations, which were accepted by the FAA.[2]

1. The unmanned aircraft (UA) must weigh less than 55 pounds (25 Kg), including energy source(s) and equipment. Operations authorized by this grant of exemption are limited to the following aircraft described in the operator's manual: Astraeus Aerial Cinema System V.3CS UAS aircraft variant, serial #001 onward (V.3). Proposed operations of any other aircraft will require a new petition or a petition to amend this grant.

2. The UA may not be flown at a ground speed exceeding 50 knots.

3. Flights must be operated at an altitude of no more than 400 feet above ground level (AGL), as indicated by the procedures specified in the operator's manual. All altitudes reported to ATC must be in feet AGL.

[2] Conditions and limitations outlined by the operator may have been modified for clarity.

4. 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 medical certificate.

5. All operations must utilize a visual observer (VO). 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.

6. The operator's manual is considered acceptable to the FAA, provided the additional requirements identified in these conditions and limitations are added or amended. The operator's manual and this grant of exemption must be maintained 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 operator's manual, the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operator's manual.

   The operator may update or revise its operator's manual. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator upon request. The operator must also present updated and revised documents if it petitions for extension or amendment. If the operator determines that any update or revision would affect the basis for which the FAA granted this exemption, then the operator must petition for amendment to their exemption. The FAA's UAS Integration Office (AFS-80) may be contacted if questions arise regarding updates or revisions to the operator's manual.

7. Prior to each flight the PIC must inspect the UAS to ensure it is in a condition for safe flight. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight. The Ground Control Station, if utilized, must be included in the preflight inspection. All maintenance and alterations must be properly documented in the aircraft records.

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 in accordance with the operator's manual. The PIC who conducts the functional test flight must make an entry in the UAS aircraft records of the flight. The requirements and procedures for a functional test flight and aircraft record entry must be added to the operator's manual.

9. The operator must follow the manufacturer's UAS aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements. When unavailable, aircraft maintenance/component/overhaul, replacement, and inspection/maintenance requirements must be established and identified in the operator's manual. At a minimum, requirements for the following must be included in the operator's manual:

a. Actuators / Servos;

b. Transmission (single rotor);

c. Powerplant (motors);

d. Propellers;

e. Electronic speed controller;

f. Batteries;

g. Mechanical dynamic components (single rotor);

h. Remote command and control;

i. Ground control station (if used); and

j. Any other components as determined by the operator;

10. The Pilot In Command (PIC) must possess at least a private pilot certificate and at least a current third-class medical certificate. 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.

11. Prior to operations conducted for the purpose of motion picture filming (or similar operations), the PIC must have accumulated and logged, in a manner consistent with 14 CFR § 61.51(b), a minimum of 200 flight cycles and 25 hours of total time as a UAS rotorcraft pilot and at least ten hours logged as a UAS pilot with a similar UAS type (single blade or multirotor). Prior documented flight experience that was obtained in compliance with applicable regulations may satisfy this requirement. Training, proficiency, and experience-building flights can also be conducted under this grant of exemption to accomplish the required flight cycles and flight time. 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.

12. Prior to operations conducted for the purpose of motion picture filming (or similar operations), the PIC must have accumulated and logged, in a manner consistent with 14 CFR § 61.51(b), a minimum of five hours as UAS pilot operating the make and model of UAS to be utilized for operations under the exemption and three take-offs and three landings in the preceding 90 days. Training, proficiency, experience-building, and take-off and landing currency flights can be conducted under this grant of exemption to accomplish

the required flight time and 90 day currency. During training, proficiency, experience-building, and take-off and landing currency 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.

13. Prior to any flight operations authorized by this grant of exemption, the PIC and VO must have successfully completed a qualification process, as outlined in the operator's manual. As this is a requirement stipulated by the operator, the test must be developed and implemented by a qualified person designated at the sole discretion of the operator. A record of completion of this qualification process must be documented and made available to the Administrator upon request.

14. Prior to operations conducted for the purpose of motion picture filming (or similar operations), a flight demonstration, administered by an operator-approved and -qualified pilot must be successfully completed and documented. This documentation must be available for review upon request by the Administrator. Because the knowledge and airmanship test qualifications have been developed by the operator, and there are no established practical test standards that support a jurisdictional FAA FSDO evaluation and approval of company designated examiners, the petitioner will conduct these tests in accordance with the operator's manual.

15. The UA may not be operated directly over any person, except authorized and consenting production personnel, below an altitude that is hazardous to persons or property on the surface in the event of a UAS failure or emergency.

16. Regarding the distance from participating persons, the operator's manual has safety mitigations for authorized and consenting production personnel. At all times, those persons must be essential to the closed-set film operations. Because these procedures are specific to participating persons, no further FSDO or aviation safety inspector approval is necessary for reductions to the distances specified in the petitioner's manuals. This is consistent with the manned aircraft procedures described in FAA Order 8900.1, V3, C8, S1 Issue a Certificate of Waiver for Motion Picture and Television Filming.

17. Regarding distance from nonparticipating persons, the operator must ensure that no persons are allowed within 500 feet of the area except those consenting to be involved and necessary for the filming production. This provision may be reduced to no less than 200 feet if it would not adversely affect safety and the Administrator has approved it. For example, an equivalent level of safety may be determined by an aviation safety inspector's evaluation of the filming production area to note terrain features, obstructions, buildings, safety barriers, etc. Such barriers may protect nonparticipating persons (observers, the public, news media, etc.) from debris in the event of an accident. This is also consistent with the same FAA Order 8900.1, V3, C8, S1.

18. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the security perimeter and land or be recovered in accordance with the operator's manual.

19. The UAS must abort the flight in the event of unpredicted obstacles or emergencies in accordance with the operator's manual.

20. Each UAS operation must be completed within 30 minutes flight time or with 25% battery power remaining, whichever occurs first.

In addition to the conditions and limitations proposed by the operator, the FAA has determined that any operations conducted under this grant of exemption must be done pursuant to the following conditions and limitations:

21. The operator must obtain an Air Traffic Organization (ATO) issued Certificate of Waiver or Authorization (COA) prior to conducting any operations under this grant of exemption. This COA will also require the operator to request a Notice to Airman (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to the operation.

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. The operator must develop procedures to document and maintain a record of the UAS maintenance, preventative maintenance, alterations, status of replacement/overhaul component parts, and the total time in service of the UAS. These procedures must be added to the operator's manual.

24. Each UAS operated under this exemption must comply with all manufacturer Safety Bulletins.

25. The operator must develop UAS technician qualification criteria. These criteria must be added to the operator's manual.

26. The preflight inspection section in the operator's manual must be amended to include the following requirement: The preflight inspection must account for all discrepancies, i.e. inoperable components, items, or equipment, not covered in the relevant preflight inspection sections of the operator's manual.

27. Before conducting operations, the radio frequency spectrum used for operation and control of the UA must comply with the Federal Communications Commission (FCC) or other appropriate government oversight agency requirements.

28. At least three days before scheduled filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local 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 filming production 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 filming production event;

    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.

29. The 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.

30. The UA must remain clear and yield the right of way to all other manned operations and activities at all times (including, but not limited to, ultralight vehicles, parachute activities, parasailing activities, hang gliders, etc.).

31. 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.

32. The UAS may not be operated by the PIC from any moving device or vehicle.

33. 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.

34. The UA may not operate in Class B, C, or D airspace without written approval from the FAA. The UA may not operate within 5 nautical miles of the geographic center of a non-towered airport as denoted on a current FAA-published aeronautical chart unless a letter of agreement with that airport's management is obtained, and the operation is conducted in accordance with a NOTAM as required by the operator's COA. The letter of agreement with the airport management must be made available to the Administrator upon request.

35. 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. Further flight operations may not be conducted until the incident, accident, or transgression is reviewed by AFS-80 and authorization to resume operations is provided.

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 September 30, 2016, unless sooner superseded or rescinded.

Issued in Washington, DC, on September 25, 2014. .

/s/
Michael J. Zenkovich
Deputy Director, Flight Standards Service

Attachment 5

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

CERTIFICATE OF WAIVER OR AUTHORIZATION

ISSUED TO

TEST SITE - Griffiss International Airport

592 Hangar Rd, Suite 200
Rome, NY 13441

This certificate is issued for the operations specifically described hereinafter. No person shall conduct any operation pursuant to the authority of this certificate except in accordance with the standard and special provisions contained in this certificate, and such other requirements of the Federal Aviation Regulations not specifically waived by this certificate.

OPERATIONS AUTHORIZED

Operation of the Microdrones MD4-1000 Unmanned Aircraft System (UAS) in Class G airspace at or below 400 feet Above Ground Level (AGL) at Musgrave Research Farm, in the vicinity of Aurora, NY, under the jurisdiction of Elmira TRACON.

LIST OF WAIVED REGULATIONS BY SECTION AND TITLE

N/A

STANDARD PROVISIONS

1. A copy of the application made for this certificate shall be attached and become a part hereof.
2. This certificate shall be presented for inspection upon the request of any authorized representative of the Federal Aviation Administration, or of any State or municipal official charged with the duty of enforcing local laws or regulations.
3. The holder of this certificate shall be responsible for the strict observance of the terms and provisions contained herein.
4. This certificate is nontransferable.

Note-This certificate constitutes a waiver of those Federal rules or regulations specifically referred to above. It does not constitute a waiver of any State law or local ordinance.

SPECIAL PROVISIONS

Special Provisions are set forth and attached.

This certificate 2014-ESA-116 is effective from September 22, 2014, to September 21, 2016, and is subject to cancellation at any time upon notice by the Administrator or his/her authorized representative.

BY DIRECTION OF THE ADMINISTRATOR

FAA Headquarters, AJV-115
(Region)

Jacqueline R. Jackson
(Signature)

September 17, 2014
(Date)

Acting Manager, UAS Tactical Operations Section
(Title)

FAA Form 7711-1 (7-74)

COA Number: 2014-ESA-116

Issued To: TEST SITE - Griffiss International Airport, referred herein as the "proponent"

Address: 592 Hangar Rd, Suite 200
Rome, NY 13441

Activity: Operation of the Microdrones MD4-1000 Unmanned Aircraft System (UAS) in Class G airspace at or below 400 feet Above Ground Level (AGL)] at Musgrave research Farm in the vicinity of Aurora, NY, under the jurisdiction of Elmira TRACON. See Attachment 1.

Purpose: To prescribe UAS operating requirements in the National Airspace System (NAS) for the purpose of research flights.

Dates of Use: This COA is valid from September 22, 2014 through September 21, 2016. Should a renewal become necessary, the proponent shall advise the Federal Aviation Administration (FAA), in writing, no later than 60 business days prior to the requested effective date.

Public Aircraft

1. A public aircraft operation is determined by statute, 49 USC §40102(a)(41) and §40125.
2. All public aircraft flights conducted under a COA must comply with the terms of the statute.
3. All flights must be conducted per the declarations submitted on COA on-line.

STANDARD PROVISIONS

A. **General.**

The review of this activity is based upon current understanding of UAS operations and their impact in the NAS. This COA will not be considered a precedent for future operations. (As changes in or understanding of the UAS industry occur, limitations and conditions for operations will be adjusted.)

All personnel connected with the UAS operation must read and comply with the contents of this authorization and its provisions.

A copy of the COA including the special limitations must be immediately available to all operational personnel at each operating location whenever UAS operations are being conducted.

This authorization may be canceled at any time by the Administrator, the person authorized to grant the authorization, or the representative designated to monitor a specific operation. As a general rule, this authorization may be canceled when it is no longer required, there is an abuse of its provisions, or when unforeseen safety factors develop. Failure to comply with the authorization is cause for cancellation. The proponent will receive written notice of cancellation.

During the time this COA is approved and active, a site safety evaluation/visit may be accomplished to ensure COA compliance, assess any adverse impact on ATC or airspace, and ensure this COA is not burdensome or ineffective. Deviations, accidents/incidents/mishaps, complaints, etc. will prompt a COA review or site visit to address the issue. Refusal to allow a site safety evaluation/visit may result in cancellation of the COA. Note: This section does not pertain to agencies that have other existing agreements in place with the FAA.

B. **Airworthiness Certification.**

The unmanned aircraft must be shown to be airworthy to conduct flight operations in the NAS. The Griffiss International Airport has made its own determination that the Microdrones MD4-1000 unmanned aircraft is airworthy. The Microdrones MD4-1000 must be operated in strict compliance with all provisions and conditions contained in the Airworthiness Safety Release, including all documents and provisions referenced in the COA application.

1. A configuration control program must be in place for hardware and/or software changes made to the UAS to ensure continued airworthiness. If a new or revised Airworthiness Release is generated as a result of changes in the hardware or software affecting the operating characteristics of the UAS, notify the UAS Integration Office of the changes as soon as practical.

a. Software and hardware changes should be documented as part of the normal maintenance procedures. Software changes to the aircraft and control station as well as hardware system changes are classified as major changes unless the agency has a formal process, accepted by the FAA. These changes should be provided to the UAS Integration office in summary form at the time of incorporation.

b. Major modifications or changes, performed under the COA, or other authorizations that could potentially affect the safe operation of the system must be documented and provided to the FAA in the form of a new AWR, unless the agency has a formal process, accepted by the FAA.

c. All previously flight proven systems to include payloads, may be installed or removed as required, and that activity recorded in the unmanned aircraft and ground control stations logbooks by persons authorized to conduct UAS maintenance Describe any payload equipment configurations in the UAS logbook that will result in a weight and balance change, electrical loads, and or flight dynamics, unless the agency has a formal process, accepted by the FAA.

d. For unmanned aircraft system discrepancies, a record entry should be made by an appropriately rated person to document the finding in the logbook. No flights may be conducted following major changes, modifications or new installations unless the party responsible for certifying airworthiness has determined the system is safe to operate in the NAS and a new AWR is generated, unless the agency has a formal process, accepted by the FAA. The successful completion of these tests must be recorded in the appropriate logbook, unless the agency has a formal process, accepted by the FAA.

2. The Microdrones MD4-1000 must be operated in strict compliance with all provisions and conditions contained within the spectrum analysis assigned and authorized for use within the defined operations area.

3. All items contained in the application for equipment frequency allocation must be adhered to, including the assigned frequencies and antenna equipment characteristics. A ground operational check to verify the control station can communicate with the aircraft (frequency integration check) must be conducted prior to the launch of the unmanned aircraft to ensure any electromagnetic interference does not adversely affect control of the aircraft.

4. The use of a Traffic Collision Avoidance System (TCAS) in any mode while operating an unmanned aircraft is prohibited.

C. **Operations.**

1. Unless otherwise authorized as a special provision, a maximum of one unmanned aircraft will be controlled:

a. In any defined operating area,

b. From a single control station, and

c. By one pilot at a time.

2. A Pilot-in-Command (PIC) is the person who has final authority and responsibility for the operation and safety of flight, has been designated as PIC before or during the flight, and holds the appropriate category, class, and type rating, if appropriate, for the conduct of the flight. The responsibility and authority of the PIC as described by 14 CFR 91.3, Responsibility and Authority of the Pilot-in-Command, apply to the unmanned aircraft PIC. The PIC position may rotate duties as necessary with equally qualified pilots. The individual designated as PIC may change during flight. **Note:** The PIC can only be the PIC for one aircraft at a time. For Optionally Piloted Aircraft (OPA), PIC must meet UAS guidance requirements for training, pilot licensing, and medical requirements when operating OPA as a UAS.

3. The PIC must conduct a pre-takeoff briefing as applicable prior to each launch. The briefing should include but is not limited to the

   a. Contents of the COA,

   b. Altitudes to be flown,

   c. Mission overview including handoff procedures,

   d. Frequencies to be used,

   e. Flight time, including reserve fuel requirements,

   f. Contingency procedures to include lost link, divert, and flight termination, and

   g. Hazards unique to the flight being flown.

   Note: Flight Crew Member (UAS). In addition to the flight crew members identified in 14 CFR Part 1, Definitions and Abbreviations, an Unmanned Aircraft System flight crew members include pilots, sensor/payload operators, and visual observers and may include other persons as appropriate or required to ensure safe operation of the aircraft.

4. All operations will be conducted in compliance with Title 14 CFR Part 91. Special attention should be given to:

   a. § 91.3 Responsibility and authority of the pilot in command

   b. § 91.13 Careless or reckless operation

   c. § 91.17 Alcohol or drugs

   d. § 91.103 Preflight Actions

   e. § 91.111 Operating near other aircraft.

   f. § 91.113 Right-of-way rules: Except water operations

   g. § 91.115 Right-of-way rules: Water operations

   h. § 91.119 Minimum safe altitudes: General

   i. § 91.123 Compliance with ATC clearances and instructions.

   j. § 91.133 Restricted and prohibited areas

k. § 91.137 Temporary flight restrictions in the vicinity of disaster/hazard areas

l. § 91.145 Management of aircraft operations in the vicinity of aerial demonstrations and major sporting events

m. § 91.151 Fuel requirements for flight in VFR conditions

n. § 91.155 Basic VFR weather minimums

o. § 91.159 VFR cruising altitude or flight level

p. § 91.209 Aircraft Lights

q. § 91.213 Inoperative instruments and equipment

r. § 91.215 ATC transponder and altitude reporting equipment and use

s. Appendix D to Part 91—Airports/Locations: Special Operating Restrictions

5. Unless otherwise authorized as a special provision, all operations must be conducted in visual meteorological conditions (VMC) during daylight hours in compliance with Title 14 of the Code of Federal Regulations (CFR) Part 91 §91.155 and the following:

6. Special Visual Flight Rules (VFR) operations are not authorized.

   a. VFR cloud clearances specified in 14 CFR Part 91 §91.155, must be maintained, except in Class G airspace where Class E airspace visibility requirements must be applied, but not less than 3 statute miles (SM) flight visibility and 1000' ceiling.

   b. Flights conducted under Instrument Flight Rules (IFR) in Class A airspace shall remain clear of clouds. NOTE: Deviations from IFR clearance necessary to comply with this provision must have prior ATC approval.

   c. Chase aircraft must maintain 5 NM flight visibility.

7. Night operations are prohibited unless otherwise authorized as a special provision.

8. Operations (including lost link procedures) must not be conducted over populated areas, heavily trafficked roads, or an open-air assembly of people.

D. **Air Traffic Control (ATC) Communications.**

1. The pilot and/or PIC will maintain direct, two-way communication with ATC and have the ability to maneuver the unmanned aircraft in response to ATC instructions, unless addressed in the Special Provision Section.

   When required, ATC will assign a radio frequency for air traffic control during flight. The use of land-line and/or cellular telephones is prohibited as the primary means for in-flight communication with ATC.

2. The PIC must not accept an ATC clearance requiring the use of visual separation, sequencing, or visual approach.

3. When necessary, transit of airways and routes must be conducted as expeditiously as possible. The unmanned aircraft must not loiter on Victor airways, jet routes, Q and T routes, IR routes, or VR routes.

4. For flights operating on an IFR clearance at or above 18,000 feet mean sea level (MSL), the PIC must ensure positional information in reference to established National Airspace System (NAS) fixes, NAVAIDs, and/or waypoints is provided to ATC. The use of latitude/longitude positions is not authorized, except oceanic flight operations.
5. If equipped, the unmanned aircraft must operate with
   a. An operational mode 3/A transponder with altitude encoding, or mode S transponder (preferred) set to an ATC assigned squawk
   b. Position/navigation and anti-collision lights on at all times during flight unless stipulated in the special provisions or the proponent has a specific exemption from 14 CFR Part 91.209.
6. Operations that use a Global Positioning System (GPS) for navigation must check Receiver Autonomous Integrity Monitoring (RAIM) notices prior to flight operations. Flight into a GPS test area or degraded RAIM is prohibited for those aircraft that use GPS as their sole means for navigation.

E. **Safety of Flight.**

1. The proponent or delegated representative is responsible for halting or canceling activity in the COA area if, at any time, the safety of persons or property on the ground or in the air is in jeopardy, or if there is a failure to comply with the terms or conditions of this authorization.
2. ATC must be immediately notified in the event of any emergency, loss and subsequent restoration of command link, loss of PIC or observer visual contact, or any other malfunction or occurrence that would impact safety or operations.
3. Sterile Cockpit Procedures.
   a. Critical phases of flight include all ground operations involving
      (1) Taxi (movement of an aircraft under its own power on the surface of an airport)
      (2) Take-off and landing (launch or recovery)
      (3) All other flight operations in which safety or mission accomplishment might be compromised by distractions
   b. No crewmember may perform any duties during a critical phase of flight not required for the safe operation of the aircraft.
   c. No crewmember may engage in, nor may any PIC permit, any activity during a critical phase of flight which could
      (1) Distract any crewmember from the performance of his/her duties or
      (2) Interfere in any way with the proper conduct of those duties.
   d. The pilot and/or the PIC must not engage in any activity not directly related to the operation of the aircraft. Activities include, but are not limited to, operating UAS sensors or other payload systems.

e. The use of cell phones or other electronic devices is restricted to communications pertinent to the operational control of the unmanned aircraft and any required communications with Air Traffic Control.

4. See-and-Avoid.

   Unmanned aircraft have no on-board pilot to perform see-and-avoid responsibilities; therefore, when operating outside of active restricted and warning areas approved for aviation activities, provisions must be made to ensure an equivalent level of safety exists for unmanned operations. Adherence to 14 CFR Part 91 §91.111, §91.113 and §91.115, is required.

   a. The proponent and/or delegated representatives are responsible at all times for collision avoidance with all aviation activities and the safety of persons or property on the surface with respect to the UAS.

   b. UAS pilots will ensure there is a safe operating distance between aviation activities and unmanned aircraft at all times.

   c. Any crew member responsible for performing see-and-avoid requirements for the UA must have and maintain instantaneous communication with the PIC.

   d. UA operations will only be conducted within Reduced Vertical Separation Minimum (RVSM) altitudes, when appropriately equipped or having received a clearance under an FAA deviation. **NOTE:** UA operations should not plan on an en-route clearance in RVSM altitudes, without being RVSM equipped.

   e. Visual observers must be used at all times except in Class A airspace, active Restricted Areas, and Warning areas designated for aviation activities.

      (1) Observers may either be ground-based or in a chase plane.

      (2) If the chase aircraft is operating more than 100 feet above/below and/or more than ½ NM laterally of the unmanned aircraft, the chase aircraft PIC will advise the controlling ATC facility.

   f. The PIC is responsible to ensure visual observers are;

      (1) Able to see the aircraft and the surrounding airspace throughout the entire flight, and

      (2) Able to provide the PIC with the UA's flight path, and proximity to all aviation activities and other hazards (e.g., terrain, weather, structures) sufficiently to exercise effective control of the UA to:

         (a) Comply with CFR Parts 91.111, 91.113 and 91.115, and

         (b) Prevent the UA from creating a collision hazard.

5. Observers must be able to communicate clearly to the pilot any instructions required to remain clear of conflicting traffic, using standard phraseology as listed in the Aeronautical Information Manual when practical.

6. A PIC may rotate duties as necessary to fulfill operational requirements; a PIC must be designated at all times.

7. Pilots flying chase aircraft must not concurrently perform observer or UA pilot duties.
8. Pilot and observers must not assume concurrent duties as both pilot and observer.
9. The required number of ground observers will be in place during flight operations.
10. The use of multiple successive observers (daisy chaining) is prohibited unless otherwise authorized as a special provision.
11. The dropping or spraying of aircraft stores, or carrying of hazardous materials (including ordnance) outside of active Restricted, Prohibited, or Warning Areas approved for aviation activities is prohibited unless specifically authorized as a special provision.

F. **Crewmember Requirements.**

1. All crewmembers associated with the operation of the unmanned aircraft, including chase operations, must be qualified or must be receiving formal training under the direct supervision of a qualified instructor, who has at all times, responsibility for the operation of the unmanned aircraft.
2. Pilots and observers must have an understanding of, and comply with, Title 14 Code of Federal Regulations, and/or agency directives and regulations, applicable to the airspace where the unmanned aircraft will operate.
3. Pilots, supplemental pilots, and observers must maintain a current second class (or higher) airman medical certificate that has been issued under 14 CFR Part 67, or an FAA accepted agency equivalent based on the application.
4. At a minimum, the use of alcohol and/or drugs in violation of 14 CFR Part 91 §91.17 applies to UA pilots and observers.
5. At a minimum, observers must receive training on rules and responsibilities described in 14 CFR Part 91 §91.111. §91.113 and §91.115, regarding cloud clearance, flight visibility, and the pilot controller glossary, including standard ATC phraseology and communication.
6. Recent Pilot Experience (Currency). The proponent must provide documentation, upon request, showing the pilot/supplemental pilot/PIC maintains an appropriate level of recent pilot experience in either the UAS being operated or in a certified simulator. At a minimum, he/she must conduct three takeoffs (launch) and three landings (recovery) in the specific UAS within the previous 90 days (excluding pilots who do not conduct launch/recovery during normal/emergency operations). If a supplemental pilot assumes the role of PIC, he/she must comply with PIC rating requirements.
7. A PIC and/or supplemental pilot have the ability to assume the duties of an internal or an external UAS pilot at any point during the flight.
8. A PIC may be augmented by supplemental pilots.
9. PIC Ratings.

   Rating requirements for the UAS PIC depend on the type of operation conducted. The requirement for the PIC to hold, at a minimum, a current FAA private pilot certificate or the FAA accepted agency equivalent, based on the application of 14 CFR Part 61, is predicated on various factors including the location of the planned operations, mission

profile, size of the unmanned aircraft, and whether or not the operation is conducted within or beyond visual line-of-sight.

a. The PIC must hold, at a minimum, a current FAA private pilot certificate or the FAA accepted agency equivalent, based on the application or 14 CFR Part 61.under all operations:

   (1) Approved for flight in Class A, B, C, D, E, and G (more than 400 feet above ground level (AGL)) airspace

   (2) Conducted under IFR (FAA instrument rating required, or the FAA accepted agency equivalent, based on the application or 14 CFR Part 61

   (3) Approved for night operations

   (4) Conducted at or within 5 NM of a joint use or public airfields

   (5) Requiring a chase aircraft

   (6) At any time the FAA has determined the need based on the UAS characteristics, mission profile, or other operational parameters

b. Operations without a pilot certificate may be allowed when all of the following conditions are met:

   (1) The PIC has successfully completed, at a minimum, FAA private pilot ground instruction and passed the written examination, or the FAA accepted agency equivalent, based on the application. Airman Test reports are valid for the 24-calendar month period preceding the month the exam was completed, at which time the instruction and written examination must be repeated.

   (2) Operations are during daylight hours.

   (3) The operation is conducted in a sparsely populated location.

   (4) The operation is conducted from a privately owned airfield, military installation, or off-airport location.

   (5) Operations are approved and conducted solely within visual line-of-sight in Class G airspace.

   (6) Visual line-of-sight operations are conducted at an altitude of no more than 400 feet Above Ground Level (AGL) in class G airspace at all times.

c. The FAA may require specific aircraft category and class ratings in manned aircraft depending on the UAS seeking approval and the characteristics of its flight controls interface.

10. PIC Recent Flight Experience (Currency).

a. For those operations that require a certificated pilot or FAA accepted agency equivalent, based on the application, the PIC must have flight reviews 14 CFR Part 61.56, and if the pilot conducts takeoff, launch, landing or recovery the PIC must maintain recent pilot experience in manned aircraft per 14 CFR Part 61.57,; Recent Flight Experience: Pilot in Command.

b. For operations approved for night or IFR through special provisions, the PIC must maintain minimum recent pilot experience per 14 CFR Part 61.57, Recent Flight Experience: Pilot in Command, as applicable.

11. Supplemental Pilot Ratings.

Supplemental pilots must have, at a minimum, successfully completed private pilot ground school and passed the written test or the FAA accepted agency equivalent, based on the application. The ground school written test results are valid for two years from the date of completion, at which time the instruction and written examination must be repeated. If a supplemental pilot assumes the role of PIC, he/she must comply with PIC rating, currency, medical, and training requirements listed in this document.

12. Ancillary personnel such as systems operators or mission specialists must be thoroughly familiar with and possess operational experience of the equipment being used. If the systems being used are for observation and detection of other aircraft for collision avoidance purposes, personnel must be thoroughly trained on collision avoidance procedures and techniques and have direct communication with the UAS pilot, observer, and other crewmembers.

13. The Agency will ensure that Crew Resource Management (CRM) training is current for all crew members before flying operational or training missions. The CRM program must consist of initial training, as well as CRM recurrent training during every recurrent training cycle, not to exceed a 12 month interval between initial training and recurrent training or between subsequent recurrent training sessions.

G. **Notice to Airmen (NOTAM).**

1. A distant (D) NOTAM must be issued when unmanned aircraft operations are being conducted. This requirement may be accomplished

a. Through the proponent's local base operations or NOTAM issuing authority, or

b. By contacting the NOTAM Flight Service Station at 1-877-4-US-NTMS (1-877-487-6867) not more than 72 hours in advance, but not less than 48 hours prior to the operation, unless otherwise authorized as a special provision. The issuing agency will require the:

(1) Name and address of the pilot filing the NOTAM request

(2) Location, altitude, or operating area

(3) Time and nature of the activity.

2. For proponents filing their NOTAM with the Department of Defense: The requirement to file with an Automated Flight Service Station (AFSS) is in addition to any local procedures/requirements for filing through the Defense Internet NOTAM Service (DINS).

H. **Data Reporting.**

1. Documentation of all operations associated with UAS activities is required regardless of the airspace in which the UAS operates. This requirement includes COA operations within Special Use airspace. NOTE: Negative (zero flights) reports are required.

2. The proponent must submit the following information through UAS COA On-Line on a monthly basis:
    a. The number of flights conducted under this COA. (A flight during which any portion is conducted in the NAS must be counted only once, regardless of how many times it may enter and leave Special Use airspace between takeoff and landing)
    b. Aircraft operational hours per flight
    c. Ground control station operational hours in support of each flight, to include Launch and Recovery Element (LRE) operations
    d. Pilot duty time per flight
    e. Equipment malfunctions (hardware/software) affecting either the aircraft or ground control station
    f. Deviations from ATC instructions and/or Letters of Agreement/Procedures
    g. Operational/coordination issues
    h. The number and duration of lost link events (control, vehicle performance and health monitoring, or communications) per aircraft per flight.

I. **Incident/Accident/Mishap Reporting.**

Immediately after an incident or accident, and before additional flight under this COA, the proponent must provide initial notification of the following to the FAA via the UAS COA On-Line forms (Incident/Accident).

1. All accidents/mishaps involving UAS operations where any of the following occurs:
    a. Fatal injury, where the operation of a UAS results in a death occurring within 30 days of the accident/mishap
    b. Serious injury, where the operation of a UAS results in a hospitalization of more than 48 hours, the fracture of any bone (except for simple fractures of fingers, toes, or nose), severe hemorrhage or tissue damage, internal injuries, or second or third-degree burns
    c. Total unmanned aircraft loss
    d. Substantial damage to the unmanned aircraft system where there is damage to the airframe, power plant, or onboard systems that must be repaired prior to further flight
    e. Damage to property, other than the unmanned aircraft.
2. Any incident/mishap that results in an unsafe/abnormal operation including but not limited to
    a. A malfunction or failure of the unmanned aircraft's on-board flight control system (including navigation)
    b. A malfunction or failure of ground control station flight control hardware or software (other than loss of control link)
    c. A power plant failure or malfunction

d. An in-flight fire

e. An aircraft collision

f. Any in-flight failure of the unmanned aircraft's electrical system requiring use of alternate or emergency power to complete the flight

g. A deviation from any provision contained in the COA

h. A deviation from an ATC clearance and/or Letter(s) of Agreement/Procedures

i. A lost control link event resulting in

(1) Fly-away, or

(2) Execution of a pre-planned/unplanned lost link procedure.

3. Initial reports must contain the information identified in the COA On-Line Accident/Incident Report.

4. Follow-on reports describing the accident/incident/mishap(s) must be submitted by providing copies of proponent aviation accident/incident reports upon completion of safety investigations. Such reports must be limited to factual information only where privileged safety or law enforcement information is included in the final report.

5. Public-use agencies other than those which are part of the Department of Defense are advised that the above procedures are not a substitute for separate accident/incident reporting required by the National Transportation Safety Board under 49 CFR Part 830 §830.5.

6. This COA is issued with the provision that the FAA be permitted involvement in the proponent's incident/accident/mishap investigation as prescribed by FAA Order 8020.11, Aircraft Accident and Incident Notification, Investigation, and Reporting.

FLIGHT STANDARDS SPECIAL PROVISIONS

A. **Contingency Planning**

1. **Point Identification**. The proponent must submit contingency plans that address emergency recovery or flight termination of the unmanned aircraft (UA) in the event of unrecoverable system failure. These procedures will normally include Lost Link Points (LLP), Divert/Contingency Points (DCP) and Flight Termination Points (FTP) for each operation. LLPs and DCPs must be submitted in latitude/longitude (Lat/Long) format along with a graphic representation plotted on an aviation sectional chart (or similar format). FTPs or other accepted contingency planning measures must also be submitted in latitude/longitude (Lat/Long) format along with a graphic representation plotted on an aviation sectional chart, or other graphic representation acceptable to the FAA. The FAA accepts the LLPs, DCPs, FTPs, and other contingency planning measures, submitted by the proponent but does not approve them. When conditions preclude the use of FTPs, the proponent must submit other contingency planning options for consideration and approval. At least one LLP, DCP, and FTP (or an acceptable alternative contingency planning measure) is required for each operation. The proponent must furnish this data with the initial COA application. Any subsequent changes or modifications to this data

must be provided to AJV-13 for review and consideration no later than 30 days prior to proposed flight operations.

2. **Risk Mitigation Plans**. For all operations, the proponent must develop detailed plans to mitigate the risk of collision with other aircraft and the risk posed to persons and property on the ground in the event the UAS encounters a lost link, needs to divert, or the flight needs to be terminated. The proponent must take into consideration all airspace constructs and minimize risk to other aircraft by avoiding published airways, military training routes, NAVAIDs, and congested areas. In the event of a contingency divert or flight termination, the use of a chase aircraft is preferred when the UAS is operated outside of Restricted or Warning Areas. If time permits, the proponent should make every attempt to utilize a chase aircraft to monitor the aircraft to a DCP or to the FTP. In the event of a contingency divert or flight termination, the proponent will operate in Class A airspace and Special Use airspace to the maximum extent possible to reduce the risk of collision with non-participating air traffic.

   a. **LLP Procedures**.

      (1) LLPs are defined as a point, or sequence of points where the aircraft will proceed and hold at a specified altitude, for a specified period of time, in the event the command and control link to the aircraft is lost. The aircraft will autonomously hold, or loiter, at the LLP until the communication link with the aircraft is restored or the specified time elapses. If the time period elapses, the aircraft may autoland, proceed to another LLP in an attempt to regain the communication link, or proceed to an FTP for flight termination. LLPs may be used as FTPs. In this case, the aircraft may loiter at the LLP/FTP until link is re-established or fuel exhaustion occurs.

      (2) For areas where multiple or concurrent UAS operations are authorized in the same operational area, a segregation plan must be in place in the event of a simultaneous lost link scenario. The segregation plan may include altitude offsets and horizontal separation by using independent LLPs whenever possible.

   b. **DCP Procedures**.

      (1) A DCP is defined as an alternate landing/recovery site to be used in the event of an abnormal condition that requires a precautionary landing. Each DCP must incorporate the means of communication with ATC throughout the descent and landing (unless otherwise specified in the Special Provisions) as well as a plan for ground operations and securing/parking the aircraft on the ground. This includes the availability of ground control stations capable of launch/recovery, communication equipment, and an adequate power source to operate all required equipment.

      (2) For local operations, the DCP specified will normally be the airport/facility used for launch and recovery; however, the proponent may specify additional DCPs as alternates.

      (3) For transit and/or mission operations that are being conducted in Class A airspace or Class E airspace above flight level (FL)-600, DCPs will be identified during the flight to be no further than one hour of flight time at any given time, taking

into consideration altitude, winds, fuel consumption, and other factors. If it is not possible to define DCPs along the entire flight plan route, the proponent must identify qualified FTPs along the entire route and be prepared to execute flight termination at one of the specified FTPs if a return to base (RTB) is not possible.

(4) It is preferred that specified DCPs are non-joint use military airfields, other government-owned airfields, or private-use airfields. However, the proponent may designate any suitable airfield for review and consideration.

c. **Flight Termination Procedures**.

(1) Flight termination is the intentional and deliberate process of performing controlled flight into terrain (CFIT). Flight termination must be executed in the event that all contingencies have been exhausted and further flight of the aircraft cannot be safely achieved or other potential hazards exist that require immediate discontinuation of flight. FTPs or alternative contingency planning measures must be located within power off glide distance of the aircraft during all phases of flight and must be submitted for review and acceptance. The proponent must ensure sufficient FTPs or other contingency plan measures are defined to accommodate flight termination at any given point along the route of flight. The location of these points is based on the assumption of an unrecoverable system failure and must take into consideration altitude, winds, and other factors.

(2) Unless otherwise authorized, FTPs must be located in sparsely populated areas. Except for on- or near-airport operations, FTPs will be located no closer than five nautical miles from any airport, heliport, airfield, NAVAID, airway, populated area, major roadway, oil rig, power plant, or any other infrastructure. For offshore locations, the proponent must refer to appropriate United States Coast Guard (USCG) charts and other publications to avoid maritime obstructions, shipping lanes, and other hazards. Populated areas are defined as those areas depicted in yellow on a VFR sectional chart or as determined from other sources.

(a) It is preferred that flight termination occurs in Restricted or Warning Areas, government-owned land, or offshore locations that are restricted from routine civil use. However, the proponent may designate any suitable location for review and consideration.

(b) The proponent is required to survey all designated areas prior to their use as an FTP. All FTPs will be reviewed for suitability on a routine and periodic basis, not to exceed six months. The proponent assumes full risk and all liability associated with the selection and use of any designated FTP.

(c) It is desirable that the proponent receive prior permission from the land owner or using agency prior to the use of this area as an FTP. The proponent should clearly communicate the purpose and intent of the FTP.

(d) For each FTP, plans must incorporate the means of communication with ATC throughout the descent as well as a plan for retrieval/recovery of the aircraft.

(e) Contingency planning must take into consideration all airspace constructs and minimize risk to other aircraft by avoiding published airways, military

training routes, NAVAIDs, and congested areas to the maximum extent possible.

(f) In the event of a contingency divert or flight termination, if time permits, the use of a chase aircraft is preferred when the UA is operated outside of Restricted or Warning Areas.

(g) In the event of a contingency divert or flight termination or other approved contingency measures, the proponent will operate in Class A airspace and Special Use airspace to the maximum extent possible to reduce the risk of collision with non-participating air traffic.

B. **Night Operation Limitations.**

Night operations are not authorized. UAS night operations are those operations that occur between the end of evening civil twilight and the beginning of morning civil twilight, as published in the American Air Almanac, converted to local time. (Note: this is equal to approximately 30 minutes after sunset until 30 minutes before sunrise).

C. Flight Standards has determined that the Microdrones MD4-1000 is not a helicopter and does not possess the ability to maneuver following a power unit failure; therefore the pilot-in-command must comply with the requirements in 14 CFR sections 91.119 (a), (b) and (c).

D. It is noted that the proponent has several COAs operating from the Musgrave Research Farm. It is incumbent upon the proponent to ensure only one UAS is airborne at any one time.

AIR TRAFFIC CONTROL SPECIAL PROVISIONS

A. **Coordination Requirements.**

1. Submission of proposed flight schedules to ATC is not required.
2. Notify Elmira Approach at 607-739-1971 fifteen (15) minutes prior to UA flight operations and immediately after flights are completed for each time block or day.
3. The Match Mate Airport is a private airport in close proximity of this UAS operational area. Prior to the commencement of operations under this authorization, the proponent must contact the manager of the airport and notify him of the proposed UAS operation. An agreement should be reached on what the airport will require for coordination, if any, prior to and/or post UAS operations. This notification may be accomplished via phone calls, e-mails, or another preferred method. Contact information for the airport owner: Mr. Ronald Buxenbaum at 2663 Dog Corners Road, Aurora, NY 13026. Phone 315-364-7635.

B. **Communication Requirements.**

1. Two-way communication with ATC is not required.
2. The PIC will monitor Elmira Approach frequency VHF 124.3 for situational awareness.

C. **Flight Planning Requirements.**

Flight plans are not required as this is a VFR operation.

D. **Lost Link & Emergency/Contingency Procedures.**

1. Lost Link Procedures:
   a. ATC does not need to be notified in the event of a lost link.
   b. The following explains the procedures that the UA will follow should a lost link occur.
      (1) The MD4-1000 will enter GPS Position Hold immediately and try to reacquire the command and control (C2) signal for a specified time (set at 30 seconds).
      (2) If the time runs out and the MD4-1000 has not reacquired the signal the UA will enter into emergency landing or homing mode (depending on the operators setting).
      (3) Emergency landing will land the MD4-1000 in location at a decent speed of 1.0 mph.
      (4) Homing mode: climb to a predefined altitude and then return to the takeoff location in a straight line. If the C2 signal was not recovered, the UA will enter emergency landing at the takeoff location.
      (5) If at any time during the procedure the C2 link is reacquired, the operator will take full control.
   c. In the event of a "fly-away," the UAS pilot will immediately notify Elmira Approach on landline 607-739-1971. Additionally, if the UA departs in a westerly direction toward Rochester Approach Control (ROC) airspace (see Atch 2), contact Approach on landline 585-463-3822. If the UA departs in a northeasterly direction toward Syracuse Approach (SYR) airspace (see Atch 2), contact Approach on VHF 126.12 (backup on landline 315-455-3840). The PIC will advise ATC of the situation and provide information:
      a. UA altitude
      b. UA last known location
      c. Direction of flight/heading
      d. Fuel on board/Battery Time
      e. Pilots intentions
      f. Termination of flight/emergency condition
2. If lost link occurs within a restricted or warning area, or the lost link procedure above takes the UA into the restricted or warning area – the aircraft will not exit the restricted or warning areas until the link is re-established.
3. The unmanned aircraft lost link mission will not transit or orbit over populated areas.
   a. Lost link programmed procedures will avoid unexpected turn-around and/or altitude changes and will provide sufficient time to communicate and coordinate with ATC.
   b. Lost link orbit points shall not coincide with the centerline of Victor airways.
4. Lost Communications:

In the event of loss of communication between the PIC, visual observer, and/or ATC (if required), the procedures will be as follows:

a. Change to back-up frequency on VHF Radio.

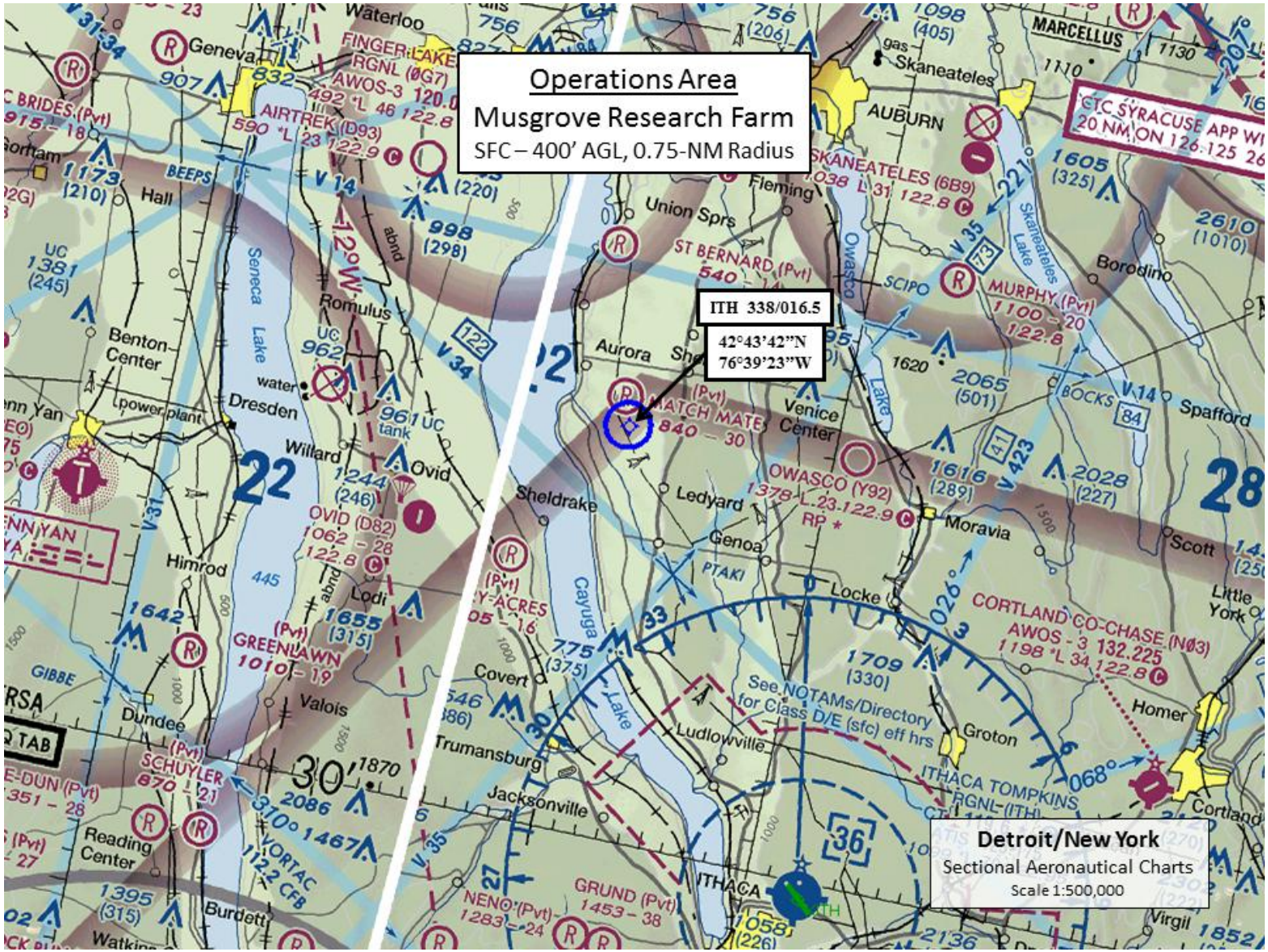
b. Call using cellular phone.

c. If communication is not possible, the PIC will commence mission termination and recover the UA. There will be no further flights until communications are restored.

AUTHORIZATION

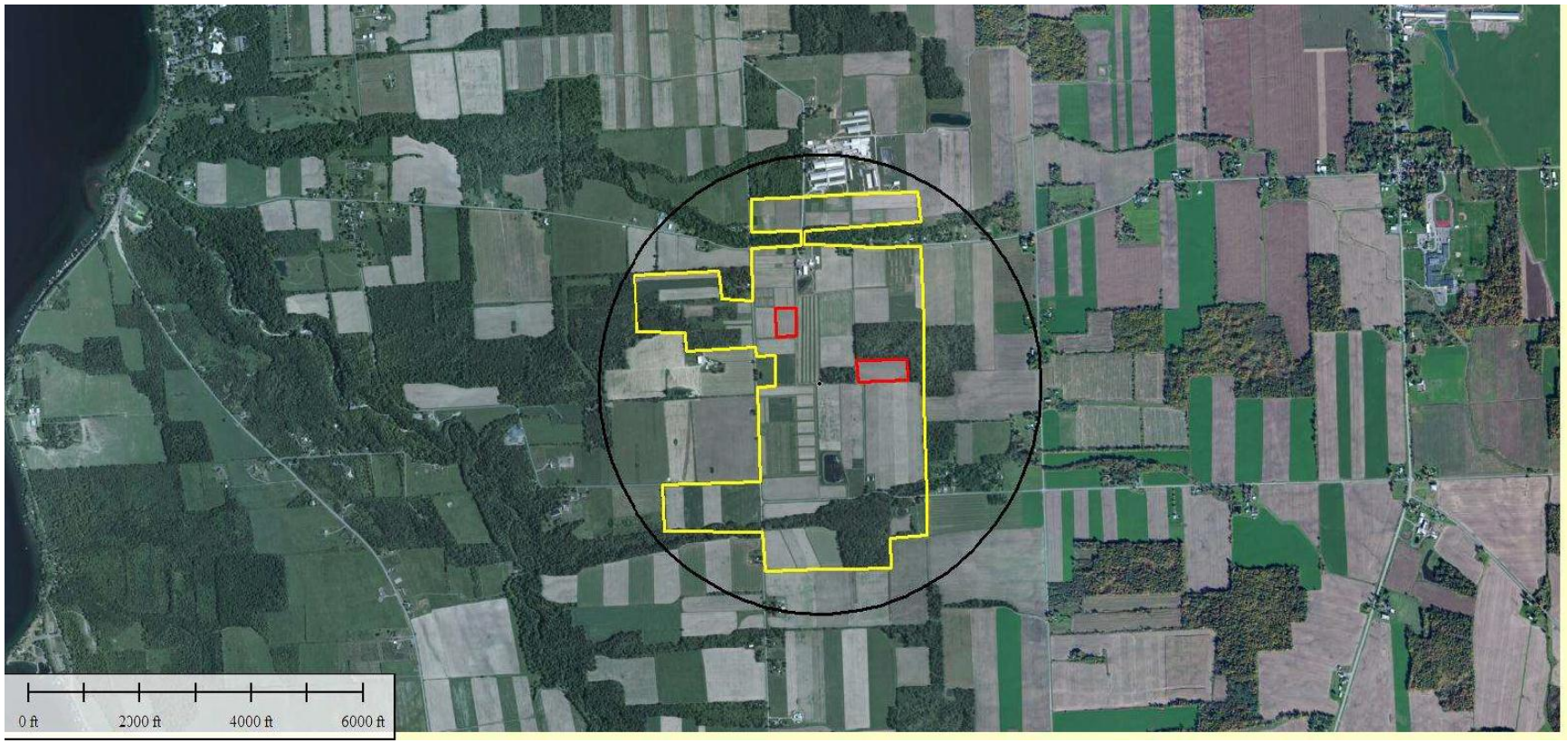
This Certificate of Waiver or Authorization does not, in itself, waive any Title 14 Code of Federal Regulations, nor any state law or local ordinance. Should the proposed operation conflict with any state law or local ordinance, or require permission of local authorities or property owners, it is the responsibility of the Griffiss International Airport to resolve the matter. This COA does not authorize flight within Special Use airspace without approval from the using agency. The Griffiss International Airport is hereby authorized to operate the Microdrones MD4-1000 Unmanned Aircraft System in the operations area depicted in the Activity section of this attachment.

Attachment 1: Page 1 of 2



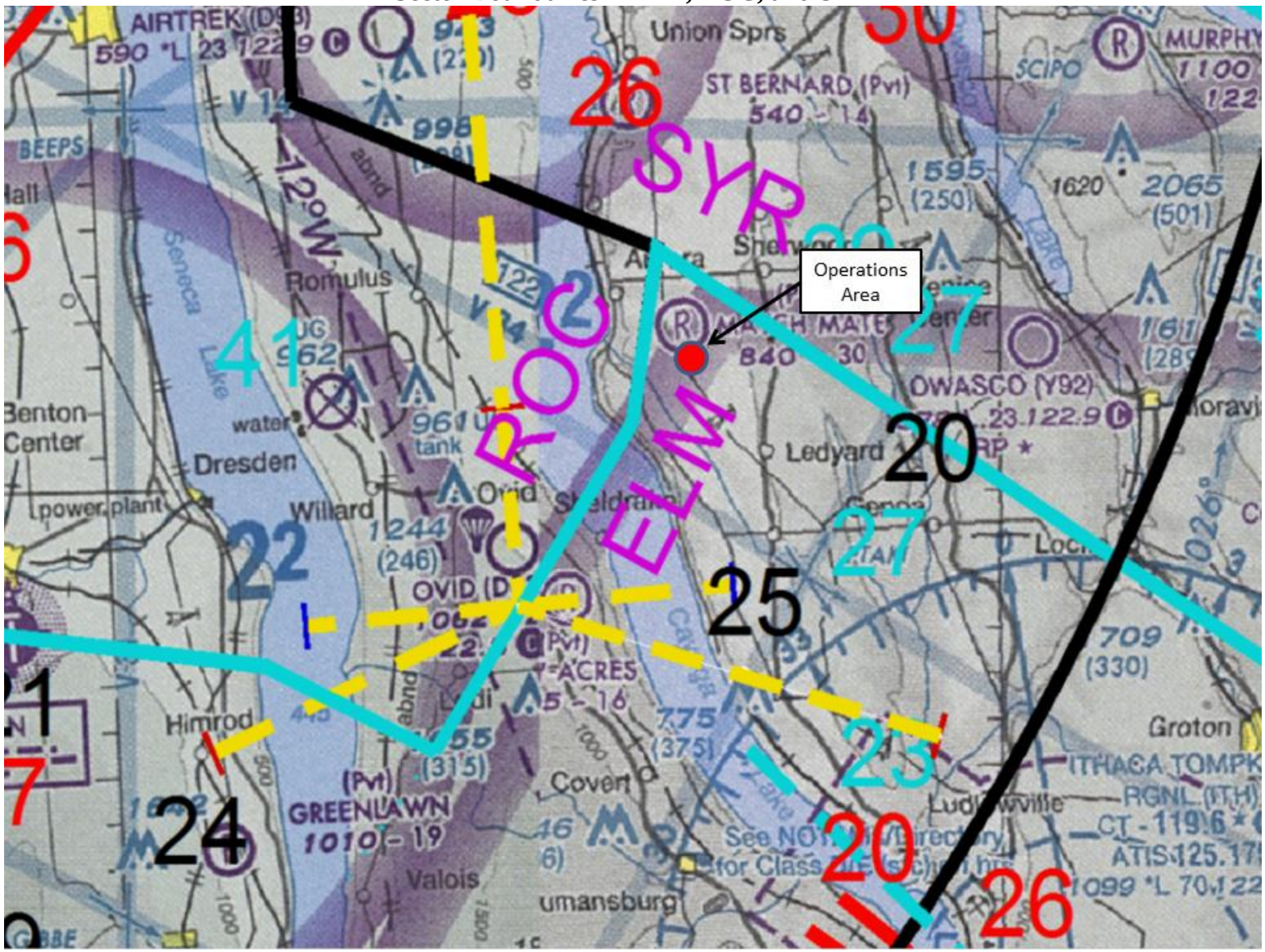
Attachment 1: Page 2 of 2

Operations Area



Attachment 2

Sector Boundaries – ELM, ROC, and SYR



Attachment 6

Transport Canada Transports Canada

4900 Yonge St., 4th Floor.
Toronto, ON M2N 6A5

UNCLASSIFIED

Your file Votre référence

Our file Notre référence
5812-15-60 (PAX-HAM)

September 12, 2014

Flyterra Canada Enterprise Inc.
Vivien Heriard Dubreuil
350 Chemin de l'Aeroport
Alma, Quebec G8B 5V2

Attention: Vivien Heriard Dubreuil – President and CEO

Certificate Number 5812-15-60-2014-01

Dear Ms. Dubreuil:

Pursuant to section 603.67 of the *Canadian Aviation Regulations* this constitutes your Special Flight Operations Certificate (SFOC) for the operation of the **Delair-Tech DT-18, Sensefly eBee, MicroDrones MD4-200** and the **MicroDrones MD4-1000** unmanned air vehicle (UAV) systems as described in your SFOC application dated **July 21, 2014.**

This Certificate is issued to **Flyterra Canada Enterprise Inc.**, operating as **Flyterra Canada**, **hereinafter referred to as Flyterra Canada.** It may be suspended or cancelled at any time by the Minister for cause, including failure on the part of the Certificate holder, its servants or agents to comply with the provisions of the *Aeronautics Act* and the *Canadian Aviation Regulations* (CARs). This Certificate is not transferable and is valid from **September 12, 2014, to September 12, 2015,** or until it is suspended or cancelled.

This Certificate is valid for the operation of the **Delair-Tech DT-18, Sensefly eBee, MicroDrones MD4-200** and the **MicroDrones MD4-1000** unmanned air vehicles for the purpose of aerial photography and topographical survey flights at **unspecified locations** within the **Province of Ontario**.

Nothing in this Certificate shall be held to relieve the Certificate holder from requirements to comply with the provisions of such Canadian Aviation Documents as may have been issued to him pursuant to the *Aeronautics Act* or the *Canadian Aviation Regulations.*

Issued under the authority of the Minister pursuant to the *Aeronautics Act*, this document certifies that the Certificate holder is adequately equipped and able to conduct a safe operation, subject to the observance and performance by the certificate holder of the following conditions:

1. Except where otherwise referred to in this Certificate, the Certificate holder shall comply with the applicable provisions of the *Aeronautics Act* and the *Canadian Aviation Regulations* (CARs).

2. The Certificate holder shall maintain an adequate management organization that is capable of exercising supervision and operational control over persons participating in the UAV operation.

3. The Certificate holder shall conduct the operation of the UAV in a safe manner.

4. The Certificate holder shall have subscribed for adequate liability insurance covering risks of public liability at the levels described in subsection 606.02(8) of the *Canadian Aviation Regulations* for the period of the UAV operation.

5. The Certificate holder shall adhere to the security plan for all selected areas of operation in accordance with the data provided in Flyterra Canada's SFOC application, dated **July 21, 2014,** or as otherwise agreed upon in writing between Flyterra Canada and Transport Canada. **Where the security plan for the selected areas of operation is not in accordance with conditions stipulated in the SFOC, the conditions of this SFOC shall prevail.**

6. The normal and emergency procedures for all selected areas of operation shall be conducted in accordance with the data provided in Flyterra Canada's SFOC application, dated **July 21, 2014,** or as otherwise agreed upon in writing between Flyterra Canada and Transport Canada. **Where the normal and emergency procedures for the selected areas of operation are not in accordance with conditions stipulated in this SFOC, the conditions of this SFOC shall prevail.**

7. The Certificate holder is responsible for ensuring that property owners, over whose property the UAV will operate, have been advised of the proposed operations and have no objection.

8. Throughout flight operations, the Certificate holder shall ensure that the UAV is flown over areas that would permit a safe landing on the surface without hazard to persons or property in the event of any emergency requiring immediate descent.

9. No more than one UAV shall be operated in-flight at any given time at the operation site.

10. The UAV shall give way to manned aircraft.

11. The UAV shall be operated during daylight hours only.

12. Operations of the UAV shall only be conducted when the weather conditions at the operation site are not less than VFR (visual flight rules) conditions for helicopters applicable to the airspace operated in. (controlled vs. uncontrolled).

13. The UAV shall be limited to a maximum altitude of **400** feet above ground level (AGL).

14. The pilot (Francis Pelletier, Sebastien Long, Michael Hogan or Vivien Heriard Dubreuil) shall maintain continuous unaided visual contact with the UAV at all times while it is being operated.

15. A crew member assigned and trained to perform duties as an observer associated with collision avoidance, such as continuously monitoring the UAV and the airspace (e.g. for other air traffic, clouds, obstructions, and terrain) both around and sufficiently beyond the UAV, shall be present for all flight operations.

16. The ground supervisor shall ensure the security of the operating location.

17. The observer and ground supervisor shall maintain constant communication with the UAV pilot at all times when the UAV is in operation.

18. Notwithstanding the requirements of paragraph 602.14(2)(b) of the *Canadian Aviation Regulations*, the UAV shall not be operated (including take-offs, landings, and flight demonstrations) at a horizontal distance of less than 30 metres away from persons who are not associated with the operation. In addition the UAV shall not be operated at a distance less than 30 metres away from any livestock or from inhabited structures such as buildings, vehicles, and vessels.

19. Flight of the UAV over spectators is prohibited.

20. The Certificate holder shall not require any person to operate the controls of the UAV if either the person or the Certificate holder has any reason to believe that the person is suffering or is likely to suffer from fatigue so that they are unfit to perform their duties.

21. No person shall operate the UAV within eight hours after consuming an alcoholic beverage or while under the influence of alcohol or while using any drug that impairs the person's faculties to the extent that the safety of the operation is endangered in any way.

22. When operations of the UAV are to be conducted within 3 NM of an aerodrome in uncontrolled airspace, the pilot shall monitor the associated communication frequency at all times during the operation.

23. The Certificate holder shall, prior to flight in **controlled airspace**, contact the air traffic control agency responsible for supplying air traffic services for the airspace affected by the operation. Validity of this Certificate is contingent upon the Certificate holder coordinating with the air traffic service provider.

24. During operation in **controlled airspace**, the Certificate holder shall comply with instructions received from the air traffic control agency responsible for the airspace in use.

25. When operations of any UAV are to be conducted within **controlled airspace** (e.g. airport control zone), or within **3** NM of an aerodrome in **uncontrolled airspace**, the Certificate holder shall contact the appropriate Flight Information Center (FIC) by phone (Winnipeg 1-866-541-4103, London 1-866-541-4104, or Quebec 1-866-541-4105), to request that a "Notice to Airmen" (NOTAM) be issued advising other aircraft of the UAV operation.

26. The Certificate holder shall report to this office, on the first working day following, details of any of the following occurrences:

    a) injuries to persons requiring medical attention resulting from the operation of the UAV authorized in this SFOC;
    b) unintended contact between the UAV and persons, livestock, vehicles, vessels or other structures;
    c) unanticipated damage incurred to the air vehicle, control station, payload or communications links;

d) any time the UAV flies outside of the bounds of operation as outlined in conditions 13 and 18 of this SFOC; and
e) any other incident that results in a Canadian Aviation Daily Occurrence Report (CADORS).

27. The Certificate holder shall not operate the UAV following any of the occurrences listed in condition **26**, until such time as this office approves its further operation.

28. All persons connected with this operation shall be familiar with the contents of this SFOC, and the contents of Flyterra Canada's SFOC application dated **July 21, 2014.**

29. The certificate holder shall ensure that all persons connected with this operation are a minimum of eighteen years of age.

30. A copy of this Certificate and a copy of Flyterra Canada's SFOC application dated **July 21, 2014**, shall be on site any time this UAV is operated under the authority of this SFOC.

Yours truly,

Henri DeBruyn
A/Technical Team Lead - Flight Operations
Civil Aviation, Ontario Region
for the Minister of Transport

Attachment 7

Transport Canada / Transports Canada
344 Edmonton Street
Winnipeg, MB
R3C 0P6

September 19, 2014

5812-11-217
RDIMS: 9897365
ATS-14-15-00022131

Vivien Heriard Dubreuil
Flyterra Canada
350 Chemin de l'Aeroport
Alma, QC
G8B 5V2

Dear Vivien Heriard Dubreuil,

Pursuant to section 603.67 of the *Canadian Aviation Regulations*, this constitutes your **Special Flight Operations Certificate (SFOC)** for the operation of the **Delair-Tech DT-18, Sensefly eBee, MicroDrones MD4-200 and MicroDrones MD4-1000 Unmanned Air Vehicles (hereafter to be referred to as the UAV)** as described in your SFOC application dated September 4, 2014, for the purpose of obtaining aerial imagery. Issued under the authority of the Minister pursuant to the ***Aeronautics Act***, this document certifies that the Certificate holder is adequately equipped and able to conduct a safe operation, subject to the observance and performance by the Certificate holder of the conditions set out in this Certificate, or any part thereof:

1. This Certificate:

    a) Is issued to **Flyterra Canada – Vivien Heriard Dubreuil**;

    b) May be suspended or cancelled at any time by the Minister for cause, including failure on the part of the Certificate holder, its servants or agents to comply with the provisions of the ***Aeronautics Act*** and the *Canadian Aviation Regulations* (CARs);

    c) Is not transferable and is valid from **September 19, 2014** to **September 31, 2015** or until it is suspended or cancelled; and

    d) Is valid for the operation of the **UAV** within the provinces of Alberta, Saskatchewan, Manitoba and the Yukon, Northwest and Nunavut Territories as described in the application dated September 4, 2014 and supporting documentation.

2. Nothing in this Certificate shall be held to relieve the Certificate holder from the requirement to comply with the provisions of such Canadian Aviation Documents as may have been issued to him pursuant to the *Aeronautics Act* or the *Canadian Aviation Regulations* (CARs).

3. For any of the **UAV's** operated under the authority of this SFOC, **Flyterra Canada** shall have subscribed for liability insurance covering risks of public liability in the amount described in subsection 606.02(8) of the *Canadian Aviation Regulations*.

4. The Certificate holder shall maintain an adequate management organization that is capable of exercising supervision and operational control over persons participating in the **UAV** operations.

5. The management organization, the facilities, the normal operations plan, the emergency operating procedures, the operating limitations, the flying areas to be used, the Security and Emergency contingency plans for the **UAV** shall be in accordance with data provided in the SFOC application dated September 4, 2014 or as otherwise agreed upon between **Flyterra Canada – Vivien Heriard Dubreuil** and Transport Canada.

6. The **UAV** must remain within the pilot operator's unaided visual line of sight and clear of cloud during flight operations. Additionally, the pilot operator's responsibilities shall not include ancillary duties which in any way detract from maintaining visual contact with the **UAV**. Payload manipulation and control shall not be the responsibility of the pilot operator.

7. The **UAV** shall be operated or supervised by personnel who are fully trained in all aspects of its flight planning, operation and recovery and who are 18 years of age or older.

8. The Certificate holder shall not require any person to operate the controls of the **UAV** if either the person or the Certificate holder has any reason to believe that the person is suffering or is likely to suffer from fatigue so that they are unfit to perform their duties.

9. No person shall operate the **UAV** within 8 hours after consuming an alcoholic beverage or while under the influence of alcohol or while using any drug that impairs the person's faculties to the extent that the safety of the operation is endangered in any way.

10. The Certificate holder shall locate an observer in the area. This observer must maintain a visual lookout for anything encroaching on the operating area or airspace and advise the **UAV** operator immediately if such a situation occurs or if the **UAV** is violating any conditions of this SFOC.

11. The Certificate holder shall ensure that sufficient site security resources and personnel are in place to ensure that the security of the **UAV** operations area is not compromised. In the event of a suspected or confirmed compromise of site security, the **UAV** flight shall be terminated immediately.

12. The Certificate holder shall conduct the operation of the **UAV** in a manner that does not pose a hazard to aviation or public safety.

13. Only one (1) **UAV** shall be operated in-flight by an operator at any one time.

14. The **UAV** shall only be operated during daylight hours.

15. The **UAV** shall only be operated when visibility in the area of operation is not less than **3 statute miles** and the cloud base is not less than **1000 feet AGL**.

16. Throughout the flight operation(s), the Certificate holder shall ensure that the **UAV** are flown over areas that would permit a safe landing on the surface without hazard to persons or property in the event of any emergency or system failure requiring or resulting in an immediate descent. Flights shall not be carried out over non-contained; Explosives, Flammable Gas, or Flammable Liquid(s) surfaces / substances unless a safe emergency landing is assured in all failure scenarios.

17. The **UAV** shall give way to manned aircraft.

18. All **UAV** operations except as restricted in conditions #34, #35 and #37shall be limited to an altitude of **400** feet above ground level (AGL).

19. The Certificate holder is responsible for ensuring that property owners, over which and from which flights of the **UAV** will take place, including take-offs and landings; have been advised of the proposed operation and have no objections.

20. The Certificate holder shall ensure that the **UAV** is operated at a distance of not less than **300** feet horizontally from inhabited structures such as buildings and vehicles without the owner's consent.

21. Flight within **300** feet horizontally of public roads is prohibited unless sufficient site security measures have been taken to prevent incursion of occupied vehicles within **300** feet horizontally of the **UAV.**

22. Any flight over persons or within **300** feet horizontally of persons not directly involved in the flight operation of the **UAV** is prohibited.

23. Flight of the **UAV** over publicly owned property is prohibited without the owner's (City, Town or Municipality) written consent. This includes but is not limited to public sidewalks, boulevards, alleyways, roads and rights of way.

24. Flight over built up areas is prohibited.

25. In the event of any emergency, loss of control or suspected malfunction of the **UAV**, the flight shall be terminated immediately until the situation is rectified.

26. The Certificate holder shall have immediately available an Emergency Procedures Checklist for the operator to follow if the UAV runs away, including the applicable Nav Canada Area Control Centre Shift Manager (Edmonton 780-890-8397 Winnipeg 204-983-8338 or Montreal 514-633-3365(if in the vicinity of Iqaluit)) and the local airport Control Tower or Flight Service Station phone numbers.

27. The Operator shall have a valid Canadian Flight Supplement and Aeronautical Charts for the flight areas to determine classes of airspace, airport locations and services.

28. For flights within the Oil Sands Area the following conditions apply;

    a) A Notice to Airman (NOTAM) must be filed with the applicable Flight Information Center (FIC) unless advised otherwise by Nav Canada; and

    b) The Certificate holder must hold an Aeronautical Radio Operators Licence, a Station License (if required by Industry Canada) and equipment appropriate to monitor the Air Traffic Advisory Frequency (ATF) of 123.5 at all times during the operation.

29. For flights within 40 nm of Portage La Prairie – Southport Airport, the following conditions apply;

    a) No flights within the CYPG control zone;

    b) The Certificate holder must hold an Aeronautical Radio Operators License, a Station License (if required by Industry Canada) and equipment appropriate to monitor 126.7 at all times during the operation; and

    c) Any flights within 40nm of Southport Airport shall notify Allied Wings Flight Operations via email at least 4 hrs prior to flight. Email address is fltops@alliedwings.ca : Include company name, contact name and telephone number, time of flight, area of operation (latitude, longitude) and maximum altitude planned.

30. Flight over Department of National Defence (DND) property or within DND controlled airspace is prohibited.

31. If the operation of the **UAV** will occur within 1 nm of DND property or DND controlled airspace, the Certificate holder shall advise DND 1 Canadian Air Division (1CAD)/SSO UAV of the intended time of the operation, specific location and other pertinent details at least two business days in advance.

32. Flights of the **UAV** within the control zones of Moosejaw Airport (CYMJ), Cold Lake Airport (CYOD) and Portage La Prairie/Southport Airport (CYPG) are prohibited.

33. Flights of the **UAV** within Class A, B and F airspace are prohibited.

34. For flights of the **UAV** within Class C and Class D control zones the following conditions are apply;

    a) Restricted to a maximum altitude of 100 feet AGL;

    b) Flight within 1 nm of any runway or helipad is prohibited;

    c) The Control Tower must be notified in advance and have no objections;

    d) The Certificate holder shall comply with all restrictions and conditions imposed by Air Traffic Control;

    e) A Notice to Airmen (NOTAM) must be filed with the applicable Flight Information Centre (FIC), unless Nav Canada advises otherwise;

    f) Prior to each flight, the Certificate holder shall contact the applicable Control Tower and obtain a clearance to operate;

    g) Cellular phone, satellite phone or radio contact must be available with the applicable Tower during the UAV operation; and

    h) After each flight, the Certificate holder shall contact the applicable Control Tower and advise that the operation is terminated.

35. For flights of the **UAV** within 5 nm of any MF or ATF aerodrome, the following conditions apply;

    a) Restricted to a maximum altitude of 100 feet AGL;

    b) Flight within 1 nm of any runway or helipad is prohibited;

    c) The aerodrome operator must be notified and have no objections;

    d) The Certificate holder shall comply with all restrictions and conditions imposed by the aerodrome operator;

    e) A Notice to Airmen (NOTAM) must be filed with the applicable Flight Information Centre (FIC), unless Nav Canada advises otherwise; and

    f) If the aerodrome;

        i. Has a Mandatory Frequency (MF) the Nav Canada Flight Service Station (FSS) or Area Control Centre responsible for the airport shall be advised prior to each flight and all instructions complied with.

        ii. Has a Mandatory Frequency (MF) without a ground based station the UAV operator must comply with the mandatory radio communication requirements of Canadian Aviation Regulation (CAR) 602.98 up to and including 602.103 as applicable.

        iii. Has an Aerodrome Traffic Frequency (ATF) the Nav Canada Flight Information Centre (FIC) responsible for the airport shall be advised prior to each flight.

    g) Cellular phone, satellite phone or radio contact must be available with the applicable Tower/Terminal or Area Control Centre as applicable during the UAV operation.

36. For flights of the **UAV** within Class G Airspace the following conditions apply;

    a) Nav Canada Flight Information Centre (FIC) responsible for the nearest airport shall be advised prior to each flight, unless advised otherwise by Nav Canada.

    b) A Notice to Airman (NOTAM) must be filed with the applicable Flight Information Center (FIC) for operations above 300 feet AGL unless advised otherwise by Nav Canada.

    c) Cellular phone, satellite phone or radio contact must be available with the applicable FIC during the UAV operation.

37. For flights of the **UAV** within 1 nm of any privately owned, uncontrolled runway or helipad, the following conditions apply:

    a) Restricted to a maximum altitude of 100 feet AGL;

    b) The aerodrome operator and users must be notified and have no objections; and

    c) The Certificate holder shall comply with all restrictions and conditions imposed by the aerodrome operator.

38. The Certificate holder shall report to Transport Canada, Winnipeg Operations, PNRspecialflightops@tc.gc.ca, on the first working day following any of the following occurrences, with details of any of the occurrences:

    a) Any **UAV** operated by the company flies outside of planned bounds of operation; or

    b) Any person being injured as a result of the operation; or

    c) Any unintended contact between the **UAV** operated by the company and persons, livestock, wildlife, vehicles or structures.

39. The Certificate holder shall not operate the **UAV** following any of the occurrences listed in condition 38. (a) (b) or (c), until Transport Canada approves its further operation in writing.

40. All persons involved with these operations (flight crew, ground station crew, and observer(s)) shall be familiar with the contents of this SFOC, the application dated September 4, 2014 and the supporting documentation.

41. A copy of this SFOC, the application dated September 4, 2014 and the supporting documentation shall be on site any time the **UAV** is in operation.

42. The Certificate holder shall:

    a) Document their flight planning and procedures for each location and flight.

    b) Document a post flight report on performance and any deviations from the plan.

    c) Keep all documentation including written consents where applicable, and make available for inspection for 2 calendar years.

Yours truly,

FOR Paul Mcculloch
Technical Team Lead Flight Operations
Civil Aviation Winnipeg
Prairie and Northern Region
For Minister of Transport