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

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

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June 23, 2015

Exemption No. 11888
Regulatory Docket No. FAA–2015–0735

Mr. David M. Garrett
Advanced Robotics Corporation
5901 East Lippizan Way
Hereford, AZ 85615

Dear Mr. Garrett:

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 March 19, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Advanced Robotics Corporation (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct education and training, aerial survey/inspection and imaging, agricultural, forestry, wildlife preservation, law enforcement, and search and rescue,.

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. The FAA received one comment from the petitioner containing a correction to the petition.

Airworthiness Certification

The UAS proposed by the petitioner are the Advanced Robotics AR−960 and AR−540.

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. 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, Advanced Robotics Corporation is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, Advanced Robotics Corporation 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 Advanced Robotics AR−960 and AR−540 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 5 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 June 30, 2017, unless sooner superseded or rescinded.

Sincerely,

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

March 19, 2015

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

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

Dear Sir or Madam,

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 ("Reform Act") and 14 C.F.R. 11, Advanced Robotics Corporation ("Petitioner") hereby applies for an exemption from Federal Aviation Regulations ("FARs") to allow commercial operation of small unmanned aircraft systems ("sUAS") in airspace regulated by the Federal Aviation Administration ("FAA") for use in a variety of commercial applications so long as such operations are conducted within and under the conditions outlined herein or as may be established by the FAA as required by Section 333.

As described more fully below, the requested exemption would permit the commercial operation of sUAS under controlled conditions in airspace that is: 1) limited; 2) predetermined; and, 3) controlled as to access. The exemption would also provide safety enhancements to the safe operations currently performed by those presently using conventional manned aircraft. Approval of this exemption would thereby enhance safety and fulfill the Secretary of Transportation's (the FAA Administrator's) responsibilities to "….establish requirements for the safe operation of such aircraft systems in the national airspace system." Section 333(c) of the Reform Act.

1. Name and Address of the Petitioner

Advanced Robotics Corporation
Attn: David M. Garrett
5901 E. Lippizan Way
Hereford, AZ 85615
Tel: 520.227.1865
Email: david.garrett@msn.com

2. Company Background

Advanced Robotics is a non-profit corporation based in Arizona specializing in education, knowledge and solutions supporting development and application of Unmanned Aircraft Systems and robotics to satisfy Government and Commercial needs. Our program assists in public awareness for new career paths and education tracks that are new and evolving resulting through crossover technologies of robotics, air, ground and water. Following approval of this exemption request would enable Advanced Robotics the use of our sUAS to conduct operations within a variety of industry and business applications such as Education and Training, Aerial Survey/Inspection and Imaging, Agricultural, Forestry, Wildlife Preservation, Law Enforcement, and Search and Rescue, so long as such operations are conducted within and under the conditions outlined herein or as may be established by the FAA as required by Section 333.

Petitioner is staffed with personnel who hold Airline Transport Pilot (ATP), Certified Flight Instructor (CFI) – Instrument (CFII), Commercial, Instrument, and Private Pilot ratings, Airframe and Powerplant (A&P) Licenses. The Petitioner has extensive experience in UAS flight/payload operations, training, and maintenance of UAS for the US Army.

This airman, and UAS knowledge and experience will be leveraged to maintain and enhance user and public safety throughout all aspects of unmanned aircraft (UA) ground and flight operations conducted by Advanced Robotics upon approval of this exemption request.

3. Regulations from which the exemption is requested, If such regulations apply to sUASs.

14 C.F.R. Part 21;
14 C.F.R. 45.23(b);
14 C.F.R. 61.113(a) & (b);
14 C.F.R. 91.7(a);
14 C.F.R. 91.9(b)(2);
14 C.F.R. 91.103;
14 C.F.R. 91.109;
14 C.F.R. 91.119;
14 C.F.R. 91.121;
14 C.F.R. 91.151(a);
14 C.F.R. 91.203(a) & (b);
14 C.F.R. 91.405(a);
14 C.F.R. 91.407(a)(1);
14 C.F.R. 91.409(a)(2);
14 C.F.R. 91.417(a) & (b).

4. Statutory Authority for Exemptions

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

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

Section 333(b) of the Reform Act assists the Secretary in determining whether sUAS may operate in the National Airspace System (NAS) without creating a hazard to the user, the public, or pose a threat to national security. In making this determination the Secretary must consider:

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

Lastly, if the Secretary determines that such vehicles "may operate safely in the national airspace system, the Secretary shall establish requirements for the safe operation of such aircraft in the national airspace system." *Id.* §333(c).

5. Secondary Documentation *(Proprietary)*

The following secondary documentation is provided for reference as supplemental information pertaining to this Petition:

1. AR-sUAS Flight Standards
2. AR-Preflight Inspection & Operations Check List
3. AR-960 sUAS Manual
4. AR-540 sUAS Manual

These documents will be retained at the ground control point accessible by the pilot in command (PIC).

6. Unmanned Aircraft Systems

Advanced Robotics designs and purpose builds its sUAS for mission specific applications utilizing commercially available airframes, flight controllers, electronics, and components. They are multirotor equipped aircraft one meter in diameter or less, and less than 55 pounds in weight including payload.

They operate at a speed of no more than 50 knots and have the ability to hover, and move in the vertical and horizontal plane simultaneously. They are equipped with GPS Flight Controllers and data link communications capability for operator control via ground control station or hand radio transmitter controllers and have battery-limited flight duration of less than one hour. The GPS Flight Controller can be programmed to limit flight duration with auto-land functions, and limits for flight distance and above ground level (AGL) altitude, and have return-to-home, loiter, and predetermined landing location functions in the event of lost data link communications or flight anomalies. Operating within visual line of sight (VLOS) of the PIC and visual observer (VO) at no more than 500 feet AGL and will operate only within the areas described herein. Such operations will ensure that the sUAS will not create a hazard to users of the NAS or the public as described in the FMRA §333(b).

Advanced Robotics proposes within this petition the use of two different sUAS platforms, AR-960 and AR-540, to support varied mission, payload configurations, and training purposes -- see provided supplemental Manuals for each. General specifications are as follows:

- **AR-960 Hex Rotor:**

Airframe: Carbon Fiber Hex Rotor – 960mm Diameter
Weight: 20 pounds (maximum with payload)
Propulsion: Six 400KV Electric Motors
Propellers: Carbon Fiber 14” – 16”
Power: 22.2 Volt, (6S) Lithium-Polymer batteries – Dual/Redundant
Speed: 0 - 45 knots
Flight Time: 40 minutes
Autopilot: GPS Flight Controller/Autopilot
Data Link: FCC approved 2.4 GHz
Video: FCC approved 5.8 GHz
Telemetry: Voltage, Current, Altitude, GPS Lat/Long, Ground Speed

- **AR-540 Quad Rotor:**

Airframe: Composite/Aluminum Quad Rotor – 540mm Diameter
Weight: 8 pounds (maximum with payload)
Propulsion: Four 740KV Electric Motors
Propellers: Carbon Fiber 10” – 12”
Power: 14.8 Volt, (4S) Lithium-Polymer batteries – Dual/Redundant
Speed: 0 - 45 knots
Flight Time: 30 minutes
Autopilot: GPS Flight Controller/Autopilot
Data Link: FCC approved 2.4 GHz
Video: FCC approved 5.8 GHz
Telemetry: Voltage, Current, Altitude, GPS Lat/Long, Ground Speed

Advanced Robotics maintains a maintenance log book for each sUAS that documents maintenance history. In addition to PIC pre-flight inspections conducted before each flight our FAA licensed A&P personnel conduct annual aircraft inspection and maintenance checks. This includes review of system and telemetry data files logged from prior flights, inspection for loose or worn components, balancing of props, cleaning of motors, battery voltage and cell balancing checks, etc., and performing any needed system repair and upgrades to include software/firmware for the GPS, Flight Controller/Autopilot, Radio Transmitter, and Ground Control Station. All scheduled or unscheduled maintenance and repair actions are documented within the sUAS maintenance log book. Upon completion of any repair, modification or upgrade, the aircraft is test flown by a qualified PIC and documented within the maintenance log book prior to return to service.

7. Operation of the Unmanned Aircraft

The PIC will be an FAA licensed airman with at least a private pilot's certificate and third class medical. Additionally, the PIC will have a minimum of 10 hours sUAS multirotor experience of which at least 5 hours are with the specific make/model sUAS to be operated (AR-960, AR-540), per the Advanced Robotics sUAS Flight Standards document.

Training of PICs who do not meet the sUAS multirotor experience will be gained within dedicated training sessions through use of a multirotor computer simulator (ground training) and the sUAS platform(s) (logged flight time) as requested through this exemption. Upon meeting the sUAS flight hour requirements, logged in a consistent manner per 14 CFR §61.5(b), a flight proficiency check will be conducted by a Advanced Robotics FAA rated CFI prior to allowing a PIC to conduct flight operations. Flight currency will be maintained by the PIC having logged 30 minutes flight time within the proceeding 90 days with the specific make/model UAS platform. Regaining currency will be achieved in dedicated training/currency sessions. In addition to flight proficiency, the PIC will be trained in use of the radio control transmitter, ground control station, pre-flight inspection of the sUAS, and operational procedures per Advanced Robotics sUAS Flight Standards document paraphrased as follows.

Minimum crew for each flight operation will consist of the sUAS PIC and Visual Observer (VO). Flights will be conducted within VLOS of the PIC at all times with VO duties assisting PIC in maintaining VLOS and situational awareness of obstructions, hazards and avoiding other aircraft. Communication between the PIC and VO will be maintained through direct voice communications and/or through use of two-way radio or cell phone throughout the duration of flight.

Prior to each flight the PIC will conduct a thorough pre-flight inspection, per

the Advanced Robotics Preflight and Operations Checklist, to ensure the sUAS is in safe condition for flight. The pre-flight will include physical inspection of components, battery voltage level checks, motor run-up, payload system, ground control station and communications checks in preparation of flight. If the inspection reveals a condition that prohibits safe operation, the PIC will remove the aircraft from service until the necessary maintenance has been performed and documented and the sUAS is found to be in a condition for safe flight.

The PIC will conduct pre-flight planning to include obtaining weather briefings, identifying hazards and obstructions, and establishing predetermined mission flight path and limited and controlled area for safe operation. The Petitioner will submit to the Air Traffic Organization (ATO) a Certificate of Waiver or Authorization (COA) prior to conducting any flight operations. The Petitioner will request a Notice to Airman (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to the operation.

All flight operations will be conducted within a limited area that is strictly controlled over private or controlled-access property with permission from the land owner or their authorized representative for each flight to be conducted. The PIC will conduct pre-flight safety briefings with all personnel supporting flight activities in regard to the planned sUAS operations and mission plan prior to each flight. Flight operations will typically be conducted at least 500 feet from all nonparticipating flight operation people, vessels, vehicles, and structures unless there are barriers or structures that safely protects nonparticipating persons in event of accident. In the event nonparticipating persons leave such protection and are within 500 feet of the sUAS, the PIC will immediately cease flight operations. Additionally, if owner of vessels, vehicles, or structures provides permission and the PIC determines safe operations can be conducted with undue risk to operating personnel then flight operations may be conducted closer than 500 feet.

Advanced Robotics will not conduct flight operations over congested or densely populated areas, or within 5 miles of an airport unless a letter of agreement is obtained from the airport management and per NOTAM. All flights will be conducted under visual meteorological conditions (VMC) during daylight hours, at less than 50 knots airspeed and an altitude no greater than 500 feet AGL, and will 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. Maximum flight time for each operational flight will be 40 minutes and allowing for no less than 20% battery as indicated by real-time telemetry voltage/current data relayed by the aircraft sensors to the PIC control station.

In event the PIC losses data link communications, the GPS equipped sUAS have the capability to return to a pre-determined location and land and

provides the PIC capability to abort flight and initiate loiter and return-to-home functions. If an in-flight emergency occurs, the PIC will immediately abort flight and initiate landing procedures.

By adhering to these operational procedures, Advanced Robotics, will achieve a safety level equivalent to, or greater than that, directed by the rules in which they seek exemption. sUAS are inherently safer in all facets due to the fact they are much smaller, fly at much slower speeds, have no human operators or occupants on board and no flammable fuels to be concerned of in event of crash. As sUAS processes are further refined, and commercial flight experience gained, the operations will serve to enhance an already higher level of safety compared to manned flight operations in which serves the public's best interest in the FAA's pursuit to integrate UAS into the NAS.

Due to the small size of the sUAS involved, ability of the PIC to control and set flight parameters, and the controlled and limited environment in which they will operate, the Petitioner 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 sUAS to commence immediately. Additionally, due to the Private Pilot rating of the PIC, the size of the sUASs, limited payload capacity and flight durations, the use of batteries versus flammable fuels, and the limited and tightly controlled areas in which the sUASs will operate, approval of the application presents no national security issue.

Given the clear direction in FRMA §333, the authority contained in the Federal Aviation Act, as amended, the strong equivalent level of safety surrounding the proposed operations, and the significant public benefit, including enhanced safety, reduction in environmental impacts due to battery operation, and reduced costs of sUAS aircraft assets as compared to conventional aircraft, the grant of the requested exemptions is in the public interest. Accordingly, Advanced Robotics respectfully requests that the FAA grant the requested exemption without delay.

8. Description of Specific Regulations

Pursuant to 14 C.F.R. § 11.81(e), Advanced Robotics seeks exemption from the below mentioned regulations and provides reason as to why the exemption should be approved based on the level of safety at least equal to that of which the rules require.

- **14 C.F.R. Part 21 Subpart H – Airworthiness Certificates**
  - **Establishes:** *The procedural requirements for the issuance of airworthiness certificates as required by 14 C.F.R. § 91.203(a)(1)*

Given the small size of the sUAS, the controlled operating areas, limitations and conditions Advanced Robotics will adhere to during flight operations, an exemption from Part 21 Subpart H meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the "Reform Act" with consideration "of the size, weight, speed, operational capability, and proximity to airports and populated areas of the particular UAS."

- **14 C.F.R. § 45.23(b) – 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.*

The sUAS to be flown by Advanced Robotics have no airworthiness certificate, an exemption may be needed as the sUAS have no entrance to the cabin, cockpit, or pilot station on which the word "Experimental" can be placed. The FAA has issued the following exemptions to this regulation to Exemptions Nos. 10700, 8738, 10167 and 10167A.

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

  - *Sections 61.113 (a) and (b) limit private pilots to non-commercial operations.*

Because the sUAS will not carry a pilot or passengers, the proposed operations can achieve the equivalent level of safety of current operations by requiring the PIC operating the aircraft to have a private pilot's license rather than a commercial pilot's license to operate a sUAS. Unlike a conventional manned aircraft, a sUAS is remotely controlled by a ground-based operator. The operational area is controlled and restricted, and all flights are planned and coordinated in advance. The level of safety exceeds that provided by a single individual holding a commercial pilot's certificate operating a conventional aircraft. The risks associated with the use of a sUAS are so diminished from the level of risk associated with commercial operations contemplated by Part 61 allowing sUAS use by a private pilot as the PIC exceeds the present level of safety sought by 14

C.F.R. §61.113 (a) and (b).

- **14 C.F.R. 91.7(a) – Civil Aircraft Airworthiness**
  - *No person may operate a civil aircraft unless it is in an airworthy condition.*

  There is no airworthiness certificate for the sUAS to be operated by Advanced Robotics. To provide an equivalent level of safety, the PIC will conduct pre-flight inspections to ensure airworthiness. During flight, the PIC will adhere to § 91.7(b) and abort air operations immediately upon identification of an in-flight anomaly or emergency. Licensed A&P staff will conduct annual inspections. Maintenance log books will be maintained for each sUAS thereby achieving an equivalent level of safety.

- **14 C.F.R. § 91.9 (b)** (2): **Civil Aircraft Flight Manual in the Aircraft.**
  - *Section 91.9 (b) (2) provides: No person may operate a U.S.-registered civil aircraft ..(2) For which an Airplane or Rotorcraft Flight Manual is not required by §21.5 of this chapter, unless there is available in the aircraft a current approved airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof.*

  The sUAS, given their size and configuration have no ability or place to carry such a flight manual on the aircraft, not only because there is no pilot on board, but because there is no room or capacity to carry such an item on the aircraft platform. The equivalent level of safety will be maintained by keeping the sUAS documentation at the ground control point where the PIC will have access to it. The FAA has issued the following exemptions to this regulation: Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 95658, 10167, 10167A, 10602, 32827, and 10700.

- **14 C.F.R. 91.103 – Pre-flight Action**
  - *Each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight. This information must include- (paragraphs a, b, 1 and 2)*

  The PIC will take all actions, to include flight and mission planning, reviewing weather, flight battery requirements, safe take-off and landing areas, and aircraft performance data before commencement of flight. In addition, the PIC will verify the sUAS is ready for flight by conducting a pre-flight inspection and run up of systems and data-link communications checks prior to each flight.

  The exemption requested for this section is specifically addressed

toward the requirements which do not apply to sUAS operations such as runways and air traffic control integration. The airport manager will be notified and approval obtained prior to any operations being executed less than five statute miles of an operating airport.

14 C.F.R. §91.109: Flight instruction

- *Section 91.109 provides that no person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls.*

sUAS and remotely piloted aircraft, by their design do not have fully functional dual controls. Flight control is accomplished through the use of a radio transmitter or ground control station that communicates with the aircraft via a receiver in the sUAS. The FAA has approved exemptions for flight training without fully functional dual controls for a number of aircraft and for flight instruction in experimental aircraft. See Exemption numbers 5778K & 9862A. The equivalent level of safety provided by the fact that neither a pilot nor passengers will be occupants in the aircraft and by the small size and slow speed of the sUAS.

- **14 C.F.R. 91.119 – Minimum Safe Altitudes**
  - *Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes: (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.*

Section 91.119 establishes safe altitudes for operation of civil aircraft. Section 91.119 (d) allows helicopters to be operated at less than the minimums prescribed, provided the person operating the helicopter complies with any route or altitudes prescribed for helicopters by the FAA. This exemption is for a sUAS and the exemption requests authority to operate at altitudes up to 500 AGL underneath navigable airspace and in class E and G airspace maintaining safe separation from manned aircraft, an exemption may be needed to allow such operations.

The equivalent level of safety will be achieved given the size, weight, speed of the sUAS as well as the limited and controlled location where it is operated. Compared to flight operations with manned aircraft weighing far more than the maximum 55 pounds proposed herein, and the lack of flammable fuel, any risk associated with these operations is far less than those presently presented with conventional manned aircraft. In addition, the low-altitude operations

of the sUAS will ensure separation between it and operations of conventional manned aircraft that must comply with Section 91.119.

- **14 C.F.R. §91.121 Altimeter Settings**
  - *This regulation requires each person operating an aircraft to maintain cruising altitude by reference to an altimeter that is set "... to the elevation of the departure airport or an appropriate altimeter setting available before departure."*

As the sUAS do not have an adjustable barometric altimeter an exemption is required. An equivalent level of safety will be achieved by the PIC, confirming the altitude of the launch site via the sUAS GPS.

- **14 C.F.R. 91.151(a) – Fuel Requirements for Flight in VFR Conditions**
  - *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;*

This regulation is written based on the capabilities of a traditional aircraft which have flight times of several hours or greater; therefore, with the majority of sUAS which have flight times of only an hour or less, this regulation would effectively deny the ability of the air vehicle to operate.

To meet the intent, Advanced Robotics, will limit its sUAS flights to 40 minutes, or no less than 20% remaining battery power, which ever occurs first, to ensure safe landing and retrieval of the air vehicle and providing at least an equal level of safety. Similar exemptions have been granted to other operations, including Exemptions 2689F, 5745, 10673, and 10808.

- **14 C.F.R. §91.203 (a) and (b): Carrying Civil Aircraft Certification and Registration**
  - *The regulation provides in pertinent part:*

    (a) Except as provided in§ 91.715, no person may operate a civil aircraft unless it has within it the following: (1) An appropriate and current airworthiness certificate....

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

passengers or crew.

The sUAS fully loaded weighs no more than 55 lbs. and is operated without an onboard pilot. As such, there is no ability or place to carry certification and registration documents or to display them on the sUAS. An equivalent level of safety will be achieved by keeping these documents at the ground control point where the PIC will have immediate access to them, to the extent they are applicable to the sUAS. The FAA has issued numerous exemptions to this regulation. A representative sample of other exceptions includes Exemption numbers 9565, 9665, 9789, 9789A, 9797, 9797A, 9816A, and 10700.

- **14 C.F.R. 91.405(a), 91.407(a)(1), 91.409(a)(2) and 91.417(a) & (b) – Maintenance Inspections**
  - **91.405(a) States:** *Each owner or operator of an aircraft—(a) Shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter.*

  - **91.407(a)(1) States:** *(a) No person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless—(1) It has been approved for return to service by a person authorized under § 43.7 of this chapter.*

  - **91.409(a)(2) States:** *(a) Except as provided in paragraph (c) of this section, no person may operate an aircraft unless, within the preceding 12 calendar months, it has had—(2) An inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter. No inspection performed under paragraph (b) of this section may be substituted for any inspection required by this paragraph unless it is performed by a person authorized to perform annual inspections and is entered as an ‘‘annual’’ inspection in the required maintenance records.*

  - **91.417(a) & (b) States:** *(a) Except for work performed in accordance with §§ 91.411 and 91.413, each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section: (paragraphs 1 (i – iii), 2 (i – vi)); (b) The owner or operator shall retain the following records for the periods prescribed: (paragraphs 1 – 3)*

Pre-flight inspections and routine maintenance will be accomplished by the PIC to ensure the sUAS is in good working order prior to flight. If mechanical issues or emergency situations arise the sUAS can land

immediately and given its small size poses very little risk to persons or property. Upon completion of any repair, modification or upgrade, the aircraft is test flown by a qualified PIC and documented within the maintenance log book prior to return to service. Annual inspections and maintenance will be conducted and documented within the sUAS maintenance log book by licensed A&P personnel to meet the intent of these regulations and provide an equivalent level of safety.

9. Summary the FAA may publish in the Federal Register

Advanced Robotics seeks an exemption from the following Regulations: 14 C.F.R. Part 21; 14 C.F.R. 45.23(b); 14 C.F.R. 61.113(a)&(b); 91.7(a); 91.9(b)(2); 91.103; 91.109; 91.119; 91.121; 91.151(a); 91.203(a)&(b); 91.405(a); 91.407(a) (1); 91.409(a) (2); 91.417(a)&(b) to commercially operate its small unmanned aircraft systems to support a variety of industry and business applications, to include, but not limited to, Education and Training, Aircraft Survey/Inspection and Imaging, Ranch and Agricultural, Forestry, Wildlife Preservation, Law Enforcement, and Search and Rescue. Granting Advanced Robotics request for exemption will reduce current risk levels and thereby enhance safety.

Further, Advanced Robotics sUAS operates at lower altitudes, up to 500 feet AGL, in predetermined and controlled airspace, weighing less than 55 pounds and traveling at speeds less than 50 knots. They will provide at least an equivalent level of safety as that achieved under current FARs.

Advanced Robotics respectfully requests that the FAA grant its exemption request without delay. The FAA has the authority to issue the exemption sought by Advanced Robotics pursuant to the Federal Aviation Act, 85 P.L. 726 (1958), as amended (the "Act").

By_____
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