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

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

June 1, 2015

Exemption No. 11724
Regulatory Docket No. FAA–2015–0161

Mr. Bryan Archer
President
Galaxy UAV Systems (a subsidiary of
Galaxy Aviation, Inc.)
6215 Kirby Lane
Frisco, TX 75035

Dear Mr. Archer:

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 January 21, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Galaxy UAV Systems (a subsidiary of Galaxy Aviation, Inc.) hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct agriculture and aerial surveying missions utilizing geographic referenced mapping system.

See Appendix A for the petition submitted to the FAA describing the proposed operations and the regulations that the petitioner seeks an exemption.

The FAA has determined that good cause exists for not publishing a summary of the petition in the Federal Register because the requested exemption would not set a precedent, and any delay in acting on this petition would be detrimental to the petitioner.

Airworthiness Certification

The UAS proposed by the petitioner are the Universeye Penguin and DJI Inspire 1.

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 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, Galaxy UAV Systems (a subsidiary of Galaxy Aviation, 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 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, Galaxy UAV Systems (a subsidiary of Galaxy Aviation, 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 Universeye Penguin and DJI Inspire 1 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 June 30, 2017, unless sooner superseded or rescinded.

Sincerely,

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

Enclosures

January 21, 2015

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

Re: Exemption Petition under Section 333 of the FAA Modernization & Reform Act, and Title 14 Part 11 of the Code of Federal Regulations (CFR)

14 CFR Part 21.191
14 CFR Part 45.23, 45.29
14 CFR 61.113, 61.133
14 CFR 91.9, 91.119, 91.121, 91.151
14 CFR 91 Subpart E (91.405, 91.407, 91.409, 91.417)

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization & Reform Act and 14 C.F.R. Part 11, Galaxy UAV Systems (Galaxy), a subsidiary of Galaxy Aviation Inc., a Part 145 FAA Certified Repair Station (FAA Air Agency # 5GXR127C), hereby applies for the grant of exemption from certain Federal Aviation Regulations for Universeye Penguin Unmanned Aircraft (Penguin) manufactured by Finwing Technology of China.
The requested exemption would support an application for a commercial Certificate of Authorization (COA) to use the Penguin to support agriculture and aerial surveying missions utilizing geographic referenced mapping system.
The Penguin consists of a lightweight (5 lb) battery operated fixed wing aircraft, a computer based ground control station (GCS), onboard cameras and associated communications equipment.
The Penguin Unmanned Aircraft has previously demonstrated to have successfully met the safety and operational requirements resulting in approval of a COA by FAA authorizing a major university in Texas to operate it.
The aircraft carries an onboard geographic referenced camera that allows it to perform precision photogrammetry and crop scouting at the resolutions necessary for precision agriculture. This high-resolution data can direct variable seeding rates as well as the precise application of fertilizer and chemicals reducing their use. This data helps farmers to maximize yields while reducing costs and impacts to the environment. By approving the exemption, the UAS will create benefits to both agriculture and the environment which are ultimately in the public interest.

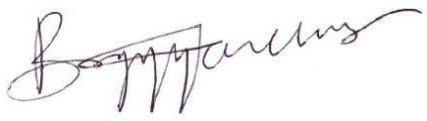
The aircraft will be operated in the field with both a Pilot in Command and a Visual Observer in accordance with FAA order 8900.1 Volume 16 "Unmanned Aircraft Systems" with the following additional restrictions:

- All operations will occur in Class G airspace at no more than 400' AGL
- Operations will be operated over private property with the permission of the land owner
- When necessary, applicable permits will be acquired from local authorities
- The aircraft will not be operated over urban or populated areas
- The aircraft will not be operated at air shows or over an open-air assembly of people
- The aircraft will not be operated over heavily trafficked roads
- The aircraft will not be operated within 5 NM of an airport or heliport
- Operations will be limited to day, visual meteorological conditions
- Aircraft will remain within Visual Line of Sight at no greater than 1/2 NM of the PIC at all time
- While the aircraft is airborne, the VO will be positioned within voice distance to the PIC
- When necessary and applicable, Galaxy will file a NOTAM providing radial/DME, radius, and a date/time group for each operation
- The PIC and VO will meet the requirements outlined in FAA Order 8900.1 Volume 16 “Airmen Certification”.

Additionally, PIC and VO will complete initial training course of maintenance instructions. Due to the simplicity of the system, we do not anticipate the need for a supplemental pilot.
For certain complex operations, Galaxy may assign one or two sensor/software operators near the GCS to process aerial maps utilizing separate computers and photogrammetry software.
We submit that the combination of ;
- Our demonstrated knowledge of Aviation Safety and FARs via our parent company (Galaxy Aviation Inc. FAA Part 145 CRS # 5GXR127C),
- Penguin UAV’s light weight and historically demonstrated safe operation and approval of COA
- fully qualified flight crew
- restricted operations under the guidelines established in FAA Order 8900.1,

the FAA can have confidence that Galaxy’s UAS the operations will have an equivalent or greater level of safety of manned aircraft performing the same mission.
We are prepared to modify or amend any part of this request to satisfy the need for an equivalent level of safety. Additional documents supporting this petition will be submitted following this request.
We look forward to working with your office. Please contact us at any time if you require additional information or clarification.

Respectfully,



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NAME, ADDRESS AND CONTACT INFORMATION OF PETITIONER

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THE SPECIFIC SECTIONS OF 14 CFR TO BE RELIEVED FROM

14 CFR Part 21.191
14 CFR Part 45.23, 45.29
14 CFR 61.113, 61.133
14 CFR 91.9, 91.119, 91.121, 91.151
14 CFR 91 Subpart E (91.405, 91.407, 91.409, 91.417)

THE EXTENT OF RELIEF GALAXY SEEKS AND THE REASONS GALAXY SEEKS THE RELIEF

14CFR Part 21.191 Experimental Certificates

This regulation establishes the procedures for the issuance of an airworthiness certificate. While the FAA continues to work to develop airworthiness standards for UAS, we request an experimental certificate be issued for the Penguin under either or both of the following provisions:

> 21.191 Experimental certificates.
> Experimental certificates are issued for the following purposes:
>
> **(a)** ***Research and development.*** Testing new aircraft design concepts, new aircraft equipment, new aircraft installations, new aircraft operating techniques, or new uses for aircraft.
>
> (b) ***Showing compliance with regulations.*** Conducting flight tests and other operations to show compliance with the airworthiness regulations including flights to show compliance for issuance of type and supplemental type certificates, flights to substantiate major design changes, and flights to show compliance with the function and reliability requirements of the regulations.

Since the experimental certificate can be used for commercial purposes such as market surveys, sales demonstrations, and customer crew training, we would expect that an experimental certificate would permit our commercial purpose as well.

The aircraft will not carry persons or property, will not carry fuel, and will only fly under strict operational requirements. Combined with the fact that the aircraft weighs only 5 pounds and is constructed primarily out of foam, we propose that the Penguin UA will be at least as safe, if not safer, than a conventionally certificated aircraft performing the same mission.

If an experimental airworthiness certificate is not appropriate for this application, then we request an exemption of 14 CFR Part 21, Subpart H, and the requirement for an

airworthiness certificate in general, citing the equivalent level of safety outlined in the previous paragraph.

14 CFR Part 45.23 Display of Marks & 45.29 Size of Marks

These regulations provide that each aircraft must display "N" and the aircraft's registration number in letters at least 3 inches high. Additionally, the aircraft must display the word "EXPERIMENTAL" in letters at least 2 inches high near the entrance to the cabin, cockpit, or pilot station. The 5 pound Penguin does not have an entrance in which the word "EXPERIMENTAL" can be placed, and may not have a registration number assigned to it by the FAA.

We propose to achieve an equivalent level of safety by including the word "EXPERIMENTAL" on the top of the aircraft, where the PIC, VO and others in the vicinity of the aircraft while it is preparing for launch will be able to see the designation.
If FAA assigns a registration number for the UA, we request that we will display registration “N” number on the aircraft by using proportionately sized letters for the Penguin’s size.
Additionally, we feel that the permanent placard discussed in the previous paragraph will provide the aircraft's registration information should it be found on the ground. Finally, we will display at the ground station a high contrast flag or banner that contains the words "Unmanned Aircraft Ground Station" in letters 3 inches high or greater. Since the aircraft will operate within 1/2 mile of the ground station, the banner should be visible to anyone that observes the aircraft and chooses to investigate its point of origin.

14 CFR 61.113 Private pilot privileges and limitations: Pilot in command and 61.133 Commercial pilot privileges and limitations

Part 61.133 provides;
“A person who holds a commercial pilot certificate may act as pilot in command of an aircraft—
(ii) For compensation or hire, provided the person is qualified in accordance with this part and with the applicable parts of this chapter that apply to the operation.”

Since there are currently no means available for the pilot of a UAS to gain the experience in an equivalent category and class in order to apply for a commercial pilot's license, we propose to generate an equivalent level of safety by requiring our pilots meet the qualification described by the order 8900.1 volume 16 chapter 4.

Our proposed operations meet the requirements of 8900.1 volume 16 Chapter 4 Section 1 Airman Certification (16-4-1-3-B) subpart (5). It states ;
"Operations without a pilot certificate may be allowed when all of the following conditions are met:" (conditions “a” through “g”)
Condition (a) states that the PIC is required to complete "FAA private pilot ground instruction" and pass "the FAA Private Pilot written examination or FAA-recognized equivalents".

Since our operations will meet all the conditions listed , we propose to comply in accordance with the FAA order 8900.1 (16-4-1-3-B-5 : “a” through “g”). We believe and request that equivalent safety can be achieved by having our pilots complete,

(1) FAA private pilot ground instruction, and pass the FAA private pilot written examination, and
(2) hold a Student Pilot Certificate along with current Third Class medical certificate, and complete logging minimum 5 hours of dual flight instruction time with Certified Flight Instructor.

If relief from part 61.133 by means of FAA Order (16-4-1-3-B-5) is not appropriate, we subsequently request the exemption from 61.113.
Part 61.113 provides that no person that holds a private pilot certificate may act as pilot in command of an aircraft for compensation or hire. Subparagraph (b) allows a private pilot to act as pilot in command of an aircraft in connection with any business or employment if;

(1) flight is only incidental to that business or employment; and
(2) The aircraft does not carry passengers or property for compensation or hire.

Since the aircraft cannot carry passengers or property, we request to be relieved from this regulation if our pilots at minimum,
(1) hold at least a current private pilot certificate and,
(2) hold a current third class medical certificate.
By meeting conditions (1) and (2), we believe that equivalent level of safety can be achieved by complying with 61.113 Subparagraph (b) even though the intent of this application is to conduct a business.

14 CFR 91.9 Civil aircraft flight manual, marking, and placard requirements.

This regulation provides that no person may operate an aircraft unless a current, approved flight manual is in the aircraft. We assume that the intent of this requirement is to ensure that flight manual information is available to the aircrew while operating the aircraft. We request an exemption to this requirement since the aircraft is not only too small to carry documentation, the documentation would not be available to the crew.

To obtain an equivalent level of safety and meet the intent of 91.9, we propose that a current, approved Airplane Flight Manual must be available to the crew at the ground station anytime the aircraft is in, or preparing for flight.

14 CFR 91.119 Minimum safe altitudes: General.

This regulation provides that over sparsely populated areas the aircraft cannot be operated closer than 500 feet to any person, vessel, vehicle, or structure. Since the aircraft will be operating at a maximum of 400 feet AGL, we cannot comply with this requirement.

To provide an equivalent level of safety we will only fly over private property with the permission of the land owner. The land owner will be briefed of the expected route of flight and the associated risks to persons and property on the ground. We maintain that due to the small size of the Penguin, the hazard to persons, vessels, vehicles, and structures is not comparable to manned aircraft and should be considered in granting the exemption.
The aircraft will not be operated over congested areas or over any open air assembly of persons. The aircraft will be operated at an altitude allowing, if a mechanical system fails, an emergency landing without undue hazard to persons or property on the surface.

14 CFR 91.121 Altimeter Settings

The regulation provides that aircraft shall maintain cruising altitudes by reference to an altimeter setting available within 100 nautical miles of the aircraft.
The Penguin aircraft will fly below 400 feet AGL and will not need to maintain hemispherical cruising altitudes in order to de-conflict with other aircraft. As such, an appropriate altimeter measurement presented to the pilot should be Above Ground Level and should be based on the barometric pressure at the point of launch.

To provide an equivalent level of safety, the UAS's AGL altimeter will be set to zero on the ground prior to every flight. Since the aircraft will fly no more than 60 minutes, even rapid changes in barometric pressure will have limited effect on the safety of the flight.

14 CFR 91.151 Fuel requirements for flight in VFR conditions.

The regulation provides that no person may begin a flight in an airplane under day-VFR conditions unless there is enough fuel to fly to the first point of intended landing and to fly after that for at least 30 minutes. We feel the intention of this paragraph is to provide a reserve of energy as a safety buffer for go-arounds and other delays to landing.

The Penguin UAS is battery operated and the maximum duration of flight with full payload, from a single battery charge is 60 minutes. Since the aircraft will never fly more than 1/2 mile from the point of intended landing, a full battery charge at launch and landing the aircraft with 10% charge (6 minutes) remaining will ensure that we meet the intent of reserve energy requirement of this paragraph.
We believe that equivalent level of safety is achieved because from anywhere within 1/2 mile distance to launch/landing point during operation, 10 % charge (6 minutes) is more than enough for a few go-arounds if necessary.

14 CFR 91 Subpart E (91.405, 91.407, 91.409, 91.417)
Maintenance, Preventive Maintenance, and Alterations

The regulation provides that the operator is primarily responsible for maintaining the aircraft in an airworthy condition, including compliance with part 39 and 43. Paragraphs 91.407 and 91.409 require that the aircraft be "approved for return to service by a person authorized under 43.7" after maintenance and inspection. It is our intention that the PIC, VO or authorized personnel to perform maintenance and inspection of the aircraft and "be authorized to approve the aircraft for return to service."

Due to the fact that our parent company Galaxy Aviation Inc. is a part 145 FAA certified Repair Station (# 5GXR127C), our core expertise is aviation maintenance. The resources from the Repair Station regarding safety training, quality control, developing maintenance procedures and other applicable resources, such as a certificated repairman, are made available to our UAS operations.

Galaxy requests that exemptions to the regulations under conditions below;

(1) Galaxy will develop and maintain Penguin UAS maintenance instructions by utilizing a combination of provided Finwing Technology's User Manual and FAA equivalent maintenance techniques and procedures

(2) Galaxy will designate, train, and document the personnel who will be authorized to perform Inspection, Maintenance and Alterations by means of above stated maintenance instructions. Such designated personnel may include PIC, VO or FAA equivalent trained persons, such as a FAA Certificated Repairman

(3) To ensure equivalent level of safety, PIC will inspect the UA before each flight looking for any structural or mechanical malfunctions, and document discrepancies

Due to the small size, light weight and simplicity of the Penguin UAS, we believe that the equivalent safety will be achieved by permitting any of the PIC, VO or FAA equivalent trained personnel, to perform maintenance, inspection and alterations of the aircraft and " be authorized to approve the aircraft for return to service. "

THE REASONS WHY GRANTING GALAXY'S REQUEST WOULD BE IN THE PUBLIC INTEREST

We believe that granting our exemption request from,
14 CFR Part 21.191
14 CFR Part 45.23, 45.29
14 CFR 61.113, 61.133
14 CFR 91.9, 91.119, 91.121, 91.151
14 CFR 91 Subpart E (91.405, 91.407, 91.409, 91.417), is in the public's interest and will benefit the public as a whole for the following reasons.

1- According to research done by US Department of Agriculture, Precision Agriculture in crop production helps farmers **yield more crops** and offers **less impact on environment** by applying chemicals more efficiently. Galaxy's Penguin UAS offers as one of the tools to support Precision Agriculture. Penguin UAS carries an onboard geo-referenced camera system that provides high-resolution data to direct variable seeding rates as well as the precise application of fertilizer and chemicals, reducing their use. This data helps farmers maximize yields while reducing costs and impacts to the environment, which is in the public interest.

2- Galaxy's UAS operations will contribute to a **positive aggregate economic impact** resulting in **creation of jobs** both direct and indirectly. Economic Research estimates that the UAS market will grow from $6 billion to $ 94 billion over the next decade resulting in a new workforce development.
Because Galaxy's operations will create new jobs such as pilots, flight operation staff, and administrative supporting staff, it will directly impact positive economic outcome, hence granting Galaxy's petition will benefit the public as a whole.

3- **Congress has already proclaimed** that it is in the public's interest to integrate Commercially flown UAS(s) into the national airspace system, hence the passing of the FAA Modernization and Reform Act of 2012.
Granting Galaxy's petition furthers the public's interest as a demonstrated progression of integrating Unmanned Aircraft Systems into National Air Space, thus it will benefit public as a whole.

THE REASONS WHY GRANTING GALAXY THE EXEMPTION WOULD NOT ADVERSELY AFFECT SAFETY

Galaxy believes that the grant of exemption from,
14 CFR Part 21.191
14 CFR Part 45.23, 45.29
14 CFR 61.113, 61.133
14 CFR 91.9, 91.119, 91.121, 91.151
14 CFR 91 Subpart E (91.405, 91.407, 91.409, 91.417), will not adversely affect safety by a combination of the reasons listed below.

(a) We have stated in the above section **" THE EXTENT OF RELIEF GALAXY SEEKS AND THE REASONS GALAXY SEEKS THE RELIEF "** on pages 4 to 8 by describing how we intend to mitigate risk and accomplish FAA equivalent and acceptable level of safety for each 14 CFR part.

(b) As a result of Penguin unmanned aircraft's size, weight, speed, operational capability, proximity to airports and populated areas, operation within visual line of sight, plus a combination of operational conditions and limitations, we believe that granting Galaxy's exemption request will not adversely affect safety.

(c) Our parent company has demonstrated, and been certified by FAA to comply with the Part 145 FARs.
Because enjoying the available resources from our parent company (Galaxy Aviation Inc. FAA Part 145 CRS) provides a unique advantage to ensure aviation safety, hence we believe that granting Galaxy will not adversely affect safety.

(d) Galaxy will develop, train and document the completion of "Human Factors " Training to the PIC, VO and authorized maintenance personnel.
Research data suggests that 80% of all Aviation Accidents are caused by "Human Factors". By requiring our flight crew and maintenance personnel to complete "Human Factors Training", Galaxy will further mitigate safety risk, thus the grant will not adversely affect safety.

SUMMARY THAT CAN BE PUBLISHED IN THE FEDERAL REGISTER

Department of Transportation
Federal Aviation Administration

Petitioner:
Galaxy UAV Systems (Subsidiary of Galaxy Aviation Inc.)

Petition of exemption from section of
14 CFR Part 21.191
14 CFR Part 45.23, 45.29
14 CFR 61.113, 61.133
14 CFR 91.9, 91.119, 91.121, 91.151
14 CFR 91 Subpart E (91.405, 91.407, 91.409, 91.417)

Description of relief sought;

Galaxy UAV Systems seeks an exemption for commercial operation of the Penguin unmanned aircraft manufactured by Finwing Technology of China.
The Penguin unmanned aircraft system has an onboard georeferenced mapping camera system capable of acquiring high resolution data.
Proposed operations will offer precise aerial surveillance to help farming, agriculture, and other commercial industries.

ANY ADDITIONAL INFORMATION, VIEWS, OR ARGUMENTS AVAILABLE TO SUPPORT GALAXY'S REQUEST

Penguin Unmanned Aircraft System consists;

1- Penguin Unmanned Aircraft made by Finwing Technology of China

2- Pixhawk Autopilot Controller made by 3D Robotics of California, and other onboard equipment such as receivers, batteries, transmitters, antennas

3- Onboard Mapping Payload
(a) Downward facing high resolution camera

(b) Optional front facing camera to aid missions

4- Ground Control Station with a computer and other related communication equipment including
(a) Manual Control link utilizing a transmitter on 2.4 Gigahertz radio frequency
(b) Data Control link utilizing GPS and Telemetry radios on 915 Megahertz radio frequency
(FCC license not required for above radio frequencies)

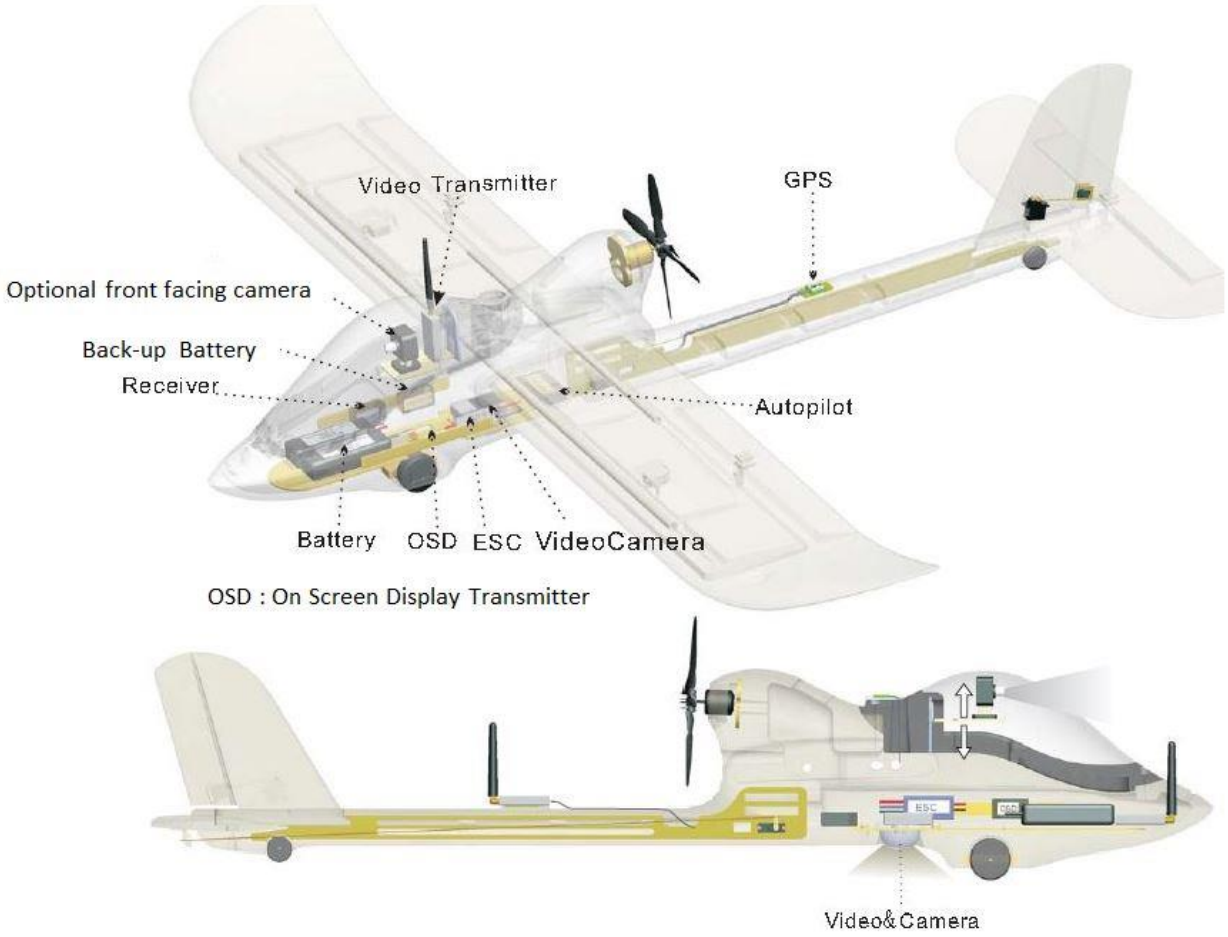
5- Qualified flight crew and optional one or two sensor/ software operators

6- Required operation manuals which are located near ground control station (the operation manuals will be submitted following this petition request)

Penguin UAS Specifications

Wing Span	67.7 inches
Length	48.5 inches
MTOW	5 pounds (Maximum Takeoff Weight)
Flight Time	30 to 60 minutes
Speed Range	15 knots to 50 knots
Manual Control Frequency	2.4 Gigahertz
Manual Control Range	Line of sight 1.5 mile
Data Control Link Frequency	915 Megahertz
Data Control Link Range	Line of sight 2 mile
Launch Options	Hand Launch or Conventional Runway
Landing Options	Belly Land or Conventional Runway

Penguin Unmanned Aircraft



Sample Mapping Mission Flight Patterns

No Privacy Issues

Galaxy's proposed operations will create no privacy issues because the Penguin UAS will be operating in rural areas within the boundaries of private property with the land owner's permission.
Galaxy will also obtain any permits or authorizations from local authorities when necessary.

ACRONYMS

AGL	Above Ground Level
ALoS	Acceptable Level of Safety
AMOC	Alternative Method of Compliance
ASI	Aviation Safety Inspector
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
ATS	Air Traffic Service
AVS	Aviation Safety
CFR	Code of Federal Regulations
COA	Certificate of Waiver or Authorization
CRM	Crew Resource Management
CS	Control Station
CRS	Certified Repair Station
DCP	Divert/Contingency Point
DHS	Department of Homeland Security
DME	Distance Measuring Equipment
DOD	Department of Defense
DSA	Detect, Sense, and Avoid System
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FARs	Federal Aviation Regulations
FIR	Flight Information Region
FL	Flight Level
FSIMS	Flight Standards Information Management System
FTP	Flight Termination Point
FTS	Flight Termination System
Galaxy	Galaxy UAV Systems
Galaxy	A subsidiary of Galaxy Aviation Inc.
GHz	Gigahertz
GCS	Ground Control Station
MHz	Megahertz
MTOW	Maximum Takeoff Weight
NAS	National Airspace System

NM	Nautical Mile
NOTAM	Notice To Airman
OPA	Optionally Piloted Aircraft
PIC	Pilot in Command
Penguin	Penguin Unmanned Aircraft System
Penguin	Penguin Unmanned Aircraft
R&D	Research and Development
RF	Radio Frequency
RM	Risk Management
RNAV	Area Navigation
RTB	Return to Base
RVSM	Reduced Vertical Separation Minimum
TAS	Traffic Advisory Systems
TC	Type Certificate
UA	Unmanned Aircraft
UAS	Unmanned Aircraft System(s)
UAV	Unmanned Aerial Vehicle
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VO	Visual Observer