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

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

July 20, 2015

Exemption No. 12090
Regulatory Docket No. FAA–2015–0566

Mr. Brian Zamudio
Director of Operations
Persistence Mining Inc.
5666 La Jolla Boulevard Unit 314
La Jolla, CA 92037

Dear Mr. Zamudio:

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 3, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Persistence Mining Inc. (hereinafter petitioner or operator) for an exemption. The exemption would allow the petitioner to operate an unmanned aircraft system (UAS) to conduct aerial mining and geological surveys.

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 is an ARMDS.

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 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, Persistence Mining 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, Persistence Mining Inc.is hereafter referred to as the operator.

[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.

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 ARMDS 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.

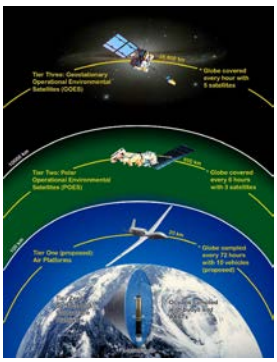
Unless otherwise specified in this grant of exemption, the UAS, the UAS PIC, and the UAS operations must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 61, and 91.

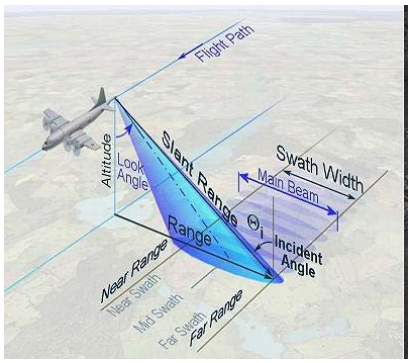
This exemption terminates on July 31, 2017, unless sooner superseded or rescinded.

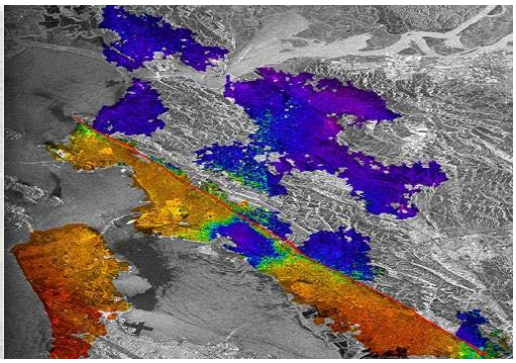
Sincerely,

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

Enclosures







UAS FAR 333 Exemption Package

Rotor Small Unmanned Air Vehicle Geological Mapping project in Nevada, New Mexico, Utah and California

Prepared by: Brian Zamudio
Director, Persistence Mining Inc.

Date: March 3, 2015

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1. Mission

1.1. Objective: To successfully complete areal mining and geological surveys using an unmanned aircraft equipped with spectral imaging sensors or LIDAR.

1.2. Description: Persistence Mining Inc.in full cooperation with the New Mexico Institute of Mining and Technology and the New Mexico Bureau of Geology, will use a small unmanned aircraft systems to perform geological surveys. Persistence Mining will perform surveys with qualified manufacturer trained personnel who have current commercial pilot certificates. The remote locations of these inspections, primarily mining site, outside of inhabited areas and cities, in geologically important areas creates an ideal use for a remote unmanned aerial surveys such technology. By conducting these inspections in adherence with all Federal Aviation Regulations that are applicable to a small unmanned systems, our team hopes to produce a real world example of how UAV's can increase knowledge, productivity and generate beneficial data to help in both geological research for education, safety, and commercial industries.

2. Vehicle Description: ARMDS

2.1. CIT Engineering Overview: CIT Engineering, Inc. is a California based company located in Carlsbad; CA. CIT is focused on providing unmanned aerial system and robots for specific client needs.

2.2. CIT Engineering has built a drone for Persistence Mining Inc. as an amateur aircraft.

2.3. ARMDS Overview:

2.4. Map remote communities in mining areas in North America, keep our highways clear and safe; and provide volumetric analysis for open pit mines.

2.5. The ARMDS can carry payloads up to 9 Kg (20 lbs.). The ARMDS flies with a maximum wind threshold of 21 NM for sustained winds and wind gusts up to 35 NM. What is unique about the ARMDS is that the system automatically compensates for wind versus relying on the operator's 'sense of feel' for what the impact of the wind is at the altitude the system is flying. The end result is a system capable of gathering high quality aerial intelligence at much higher wind thresholds.

2.6. The ARMDS has an operational range of up to 21 NM (25 Miles). All flight operations are GPS controlled making the system extremely easy to navigate. At any point if the operator is not explicitly commanding the system to move, the system automatically holds its GPS position (i.e. GPS hold for reliable location hover). Camera positioning is also GPS controlled allowing for the most sophisticated camera targeting available. The flight control system employs not only GPS positioning but a variety of sensors including sonar, barometric pressure, temperature, wind speed and others to ensure the most stability of any system in its class-regardless of the wind.

2.7. The ARMDS can be operated in both semi and fully automatic flight modes. Creating preplanned gridline flight paths to fly in autonomous mode is as simple as clicking on the map to create a preplanned flight plan. In semi-autonomous mode, the operator clicks on the map and the ARMDS automatically flies to the point on the map where the operator is pointing. Pre-mission waypoints, Landing zone points and flight area dimensions can all be entered during preflight ensuring the ARMDS operates solely within specified parameters

2.8. The ARMDS includes many advanced safety features that make it safe near roadways and in urban and rural areas. Built-in intelligent fault handling allows the ARMDS to detect a system fault while in the air, and to automatically fly back to its take-off location and land. Faults which can be detected by internal sensors include: loss of communication RFP: Unmanned Aircraft Vehicle (UAV) for “at height” Inspection to the command station; exceeding pre-set wind thresholds exceeded; and low battery levels. In addition, the operator can create no fly zones or maximum flight ranges and altitudes so the system cannot enter areas deemed unsafe, populated or unnecessary exploration. Automated flight checks ensure the system is operating at peak performance prior to take off.

2.9. The ARMDS can be operated entirely by a touch-screen and a GPS map based interface. Translated: the operator only needs to program the system where to go, the specific dimensions of the gridlines and then system automatically plots the course within the parameters to gather necessary research data. Maps can be saved and flight plans can be made or recalled with no internet connection required.

2.10. ARMDS Operating Handbook - System User Guide is carried with the UAV in a carrying case for easy reference.

2.11. Physical Characteristics

2.11.1. 82” length, 20” height

2.11.2. Measurements – Wingspan of 7.5 ft.

2.11.3. Weight (without payload) – 25 lbs.(11.3 KG)

2.11.4. Fuel – 2gallon - 2-stroke gasoline

2.11.5. Landing style/type – Autonomous vertical lift

2.12. Propulsion System

2.12.1. Engines – The ARMDS is powered by Bergen/Zenoah 52cc 2-stroke

2.12.2. Batteries- 2-cell lithium polymer 5000mAh

2.13. Performance Characteristics

2.13.1. Performance Charts - Available upon request

2.13.2. Maximum Altitude – 40 ft. AGL

2.13.3. Maximum Endurance – 6-8 Hours

2.13.4. Maximum Range –21 NM (25 miles)

2.14. Weather

2.14.1.1. Winds Maximum – 21 NM (25 MPH sustained), 35NMH (40 MPH) gusts

2.14.1.2. Minimum ceiling: 1

2.14.1.3. Maximum ceiling 400 feet

2.14.1.4. Minimum visibility: 3 SM

2.14.1.5. Icing conditions – no icing conditions

2.14.1.6. Precipitation – no visible moisture

2.14.1.7. Operating temperature-: -22°F - 122°F

2.15. Maintenance Requirements: the UAV is nearly maintenance free, it performs automatic pre-flight checks and the failure of any check will prevent take-off. Checks which cannot be done by the system will be performed by a qualified person prior to each flight.

2.14.1 Pre-flight checklist includes:

2.14.1.1 Visual inspection of the airframe

2.14.1.2 Visual inspections of rotor integrity

2.14.1.3 Check charge of all batteries (aerial vehicle, command station, radio repeater station)

2.15 Reliability: The system is designed for maximum reliability to maintain performance over its life. The only components experience routine wear are rotors, batteries, motors, and legs. Battery and motor conditions are monitored by the system with deviations reported to the operator.

2.15.1 Contact with other objects during flight may cause other components, particularly rotors, and motor arms, to become damaged. Damaged components are likely to be detected during the full visual inspection of the airframe performed before each flight. Structural damage affecting flight characteristics will be detected by on-board sensors.

2.15.2 The UAV system detects numerous conditions which may make flying unsafe, such as reduced GPS accuracy, magnetic anomalies, low battery charge, battery cell imbalances, and temperature fluctuations. Automatic pre-flight checks prevent the UAV from taking off if such conditions are present; or, if the condition is detected during flight, the system will trigger a Fatal Conditioned Response.

2.16. Fault Tolerance: The key feature of the UAV fault tolerance is its mechanical simplicity. It uses. Any component failure detectable by the system will be reported to the control station and will cause the UAV to perform a Fatal Condition Response (FCR) or Non-Fatal Conditioned Response (NFCR), depending on the type of failure.

3. Command and Control Systems

3.1. The ARMDS Ground Controls allow the operator to control the aircraft and its payload sensors. The touch screen control allows for quick navigation and data entry while the

display screen provides all essential flight data to the operator. Telemetry data is transmitted to the command station at a minimum rate of once per second.

3.2. Displayed on GCS:

- 3.2.1. UAV Position
- 3.2.2. Navigation Route
- 3.2.3. UAV Tail Number
- 3.2.4. UAV Position
- 3.2.5. UAV Altitude
- 3.2.6. UAV Heading
- 3.2.7. North Seeking Arrow
- 3.2.8. Range to Target
- 3.2.9. Calculated target position
- 3.2.10. Date/time
- 3.2.11. Sensor heading and orientation relative to UAV

3.3. On-board Flight Instruments

- 3.3.1. The UAV is equipped with an Inertial Navigation System (3-axis gyroscope, 3-axis magnetometer, GPS receiver, and static pressure sensor) and a sonar sensor for precision AGL altitude measurement.

3.4. On–board computer systems

- 3.4.1. The UAV is equipped on-board computer systems to monitor (sensors, battery, etc.), control (speeds, altitude, position, etc.), and communicate (control, telemetry, etc.).

3.5. On-board guidance and navigation equipment

- 3.5.1. The UAV can operate autonomously; it does not require any input from ground-based equipment after it‘s preflight programming.

3.6. Frequency Allocations- 915 MHz, 2.4 GHz, 5.8 GHz

3.7. Flight termination link

3.7.1. To prevent a “fly away” or other potentially dangerous situation a flight termination link is available to the operator from the ground control system.

3.8. Takeoff and Landing – The ARMDS has vertical lift autonomous launch and recovery. A Landing Zone “LZ” is designated by the operators and identified in the GCS software. For launch procedures the aircraft will takeoff and hover 3 meters directly above the LZ and hold until further operator instruction is given. The aircraft will automatically adjust for wind during this period.

3.9. Navigation System

3.9.1. Specific maps can be downloaded to the display screen (such as air sectional and geographic maps) which is overlaid with GPS positional data. Waypoints can be created before and during flight operation creating specific locations and sequences for the aircraft

3.10. Redundant Systems

3.10.1. The UAV combines the input from a multitude of sensors. Even though the data from all sensors is required for optimal system performance, a single sensor malfunction is likely to result in degraded performance rather than leading to a catastrophic failure.

4. Emergency Procedures and System Failures

4.1. Failure Handling – The UAV has extensive failure detection and handling capabilities. All failures are deeded to be either fatal or non-fatal. Failures classified as fatal result in a Fatal Condition Response (FCR); and failures classified as non-fatal result in a Non-Fatal Condition Response (NFCR).

4.2. Sensor Failure – Failure of on-board flight instruments/sensors will degrade the UAS performance and will result in either a FCR or a NFCR, depending on their severity. If the UAV becomes unstable due to sensor failure, it will stop all four motors and free fall to avoid a fly away condition.

4.3. Motor Failure – The UAV flight performance will degrade significantly if one or more motors fail.

4.4. Airframe Failure – If airframe is damaged in ways that impacts flight characteristics, the UAV will behave similar to if an on-board flight instrument failed.

4.5. Navigation System Failure – In a navigation system failure, degraded GPS will result in FCR or NFCR‘s depending on failures.

4.6. Power Failure – A complete battery failure which results in power loss to the UAV will result in degraded flight performance.

4.7. Low Battery Condition – Operator will be alerted of a low battery condition and will land the aircraft as soon as able.

4.8 Low Battery Condition – Operator will be alerted of a low battery condition and will land the aircraft as soon as able.

4.9. Line-of-Sight Loss – All flight operations will be conducted with the UAV within visual sight of a spotter. If the spotters view becomes obstructed and line-of-sight is lost, the pilot may instruct the UAV to hover in place until line-of-sight is reestablished, to return to the take-off position, or to land at the current position.

5. Security

5.1. The system and communication links are encrypted by the manufacturer’s proprietary software.

6. Operations

6.1. Crew Requirements – Persistence Mining Inc. has named two operators to this inspection program. Both are commercially rated pilots and have years of experience in multiple unmanned systems. Operators will be flight current for both manned and unmanned standards and as well hold a current Class II FAA Medical Certificate along with appropriate flight currency.

6.2. Operator roles:

6.2.1 Operator/Pilot in Command (PIC) – For each operation a PIC will be designated, this person will be directly responsible for the operation of the UAS and the

safety of the operation. It will be the responsibility of the PIC to ensure the operation complies with applicable regulations and/or ensures professional “best practice” to all applicable regulations.

6.2.2 Spotter/back-up Pilot – The Spotter will be responsible to visually maintain contact with the UAV while scanning the area for undetected aircraft or obstacles. The Observer will also handle the communications between the PIC, external crew, air safety officer and the platform safety officer. The observer will also be a certified and a current system operator and will assume control of the UAS should the PIC become incapacitated.

6.2.3 Operator profiles:

6.2.3.1 Maintenance: Operators will hold appropriate maintenance certification for the system provided by the UAV servicer and/or manufacturer.

7. Safety

7.1. Safety is priority for every mission. The location and details of the task demand the safe operations. Several layers of safety management will be implemented for this operation:

7.2. All flight operations must meet standards written in the Pre-mission operations plans and risk matrixes will be reviewed prior to any operation. During operations, Safety Officer(s) will be present along with Persistence Mining personnel who all have “stop work authority” over the operation.

7.3. FAR & ICAO Regulations. This operation will conduct under all applicable FAA and ICAO regulations. While the location and scope of this operation provides exemption from many of the regulations, Persistence Mining Inc. Persistence will ensure operations fall under “best practice” of all appropriate regulations.

7.4. Persistence Mining Standard Operating Procedures.

7.4.1 Persistence Mining Operators will maintain internal company safety practices at all times. These internal regulations are in addition to all applicable FAR, ICAO standards.

7.5. Stop Work Authority. Any Persistence Mining personnel can, at any time, halt an operation in the name of safety without retribution or concern for their jobs.

7.6. Operating Standards – To assure safe operation within close proximity to roads or possibly inhabited areas the ARMDS will be operated in autonomous mode at all times. Manual operation is only permitted in the case of an emergency procedure as stated in the aircraft operational procedures manual.

7.6.1 Safe Operating Standards

7.6.1.1 Efforts will be in place to ensure that an emergency free fall to the ground will not result to damage or injury to persons or property.

7.6.1.2 The PIC shall be designated for every flight and operations members must comply with PIC instructions or any person whom the PIC has authorized to act on behalf of the PIC.

7.6.1.3 Operations will not occur beyond visual line-of-sight (VLOS) and will be within the inspection region of the platform.

7.6.1.4 The UAV will follow the same right-of-way rules as any manned glider, airplane or helicopter. Since the UAV will be operating within VLOS they shall give way to manned aircraft at all times.

7.6.1.5 The operation will take place only under visual flight conditions and all applicable visual flight rules will be followed.

7.7 Site Survey – An on location site survey will be conducted by assigned operators prior to any operation. Site surveys will be coordinated with all interested parties prior to flight inspection.

7.7.1 Locations of hazards

7.7.2 Location of Launch/Recovery site

7.7.3 Location of forward observers

8. Mission Parameters

8.1. Dimensions – Persistence Mining operators will act inside the surveyed flight Inspection area. These parameters will be programmed prior to any survey and in accordance with

specific needs of the survey area and needs of the client. This will create a digital flight box for the UAS and a grid system where we can identify the location of the UAS at all times.

8.2 Example

8.3 Operating Altitude – The UAS will operate at or below 400 ft. AGL at all times.

8.4 Lateral Distance – The UAS will stay within 2 miles laterally of the pilot at all times.

8.5 Air Traffic De-confliction – There is a very small volume of air traffic in the survey regions due to the remote locations. All air traffic in the area is almost completely limited to helicopter traffic coming to and from the production platform. These helicopter flights are scheduled and in constant communication with platform air traffic officer. Inspections will occur in “dead” periods in- between scheduled arrivals and departures. Operators will have aviation band radios with communications to the air officer at all times.

8.6 Emergency return-to-base – The system will be pre-programmed with an emergency return-to home waypoint. Should notice be given by an observer or air traffic officer the system will at all times be able to return to land within a five minute period.

8.7 Observers – The back-up PIC will act as the observer and be in communication with the safety personnel and flight officer /pilot, as well as aviation frequencies for the platform.

8.8 Communication – The operating personnel will have direct communication links to the observers, safety personnel and monitoring geologists. The safety personnel will handle the communications for the flight operations team. The flight officer/pilot will have an aviation band radio to communicate with any traffic in the area.

9. Pre-Flight

9.1 Flight Operations Area – Prior to starting operations, the flight team will set up equipment in a fight controls in a stationary area with a distance from the take-off pad of a minimum of 20 meters insuring safety.

9.2 Ground Control System is operational

9.3 Launch/Recovery zone is free and clear of debris

9.4 Launch/Recovery zone is clearly marked for safety

9.5 Weather report within 30minutes

9.6 Airspace dimensions loaded into computer

9.7 Telemetry playback ready

9.8 All operations personnel are briefed to the particulars of the Flight Operations Area ensuring a solitary flight environment for operators

9.9 Weather minimum for operation – Per best practice standards, operations will take place in VFR conditions; no instrument flight is authorized at any time.

9.10 Pre-Flight Checks – Checklists will be used at all times without exceptions

10. Launch

10.1 Launch operation will take place at pre-determined LZ. The LZ will be clearly marked as such to ensure safety with ground personnel.

10.1.1 Authority to Launch – The system cannot be launched without:

10.1.2 Approval from Persistence safety officer

10.1.3 Approval from Observer

10.1.4 After the PIC has received clearance from these sources the PIC will have authority to proceed with the operation.

11. Recovery

11.1 Recovery operation will take place at pre-determined LZ. The LZ will be clearly marked as such to ensure safety with ground personnel.

11.2 Authority to Recover – The system cannot be recovered until it is safe to do so as determined by the Persistence Mining personnel on duty.

11.3 Communication – After recovery operation is complete operators will inform air traffic officer and safety officers that the vehicle is safe on deck. Any notification to the airspace control/change of status to any flight plans will be report at this time.

12. Post-mission reporting

12.1 After each operation personnel will create a report summarizing details and telemetry of the flight. These reports will be made available to FAA personnel upon request and will include:

12.2 Launch time

12.3 Recovery time

12.4 Mission duration

12.5 Weather at launch

12.5.1. Ceilings

12.5.2 Winds

12.5.3 Temperature

12.6 Payload used

12.7. Battery used

12.8 Operators

12.9 Mission summary

13. Emergency Management

13.1 Emergencies will be handled in accordance with Shell Platform Emergency Procedures

13.2 Emergency Contact Information

13.2.1 Persistence Mining Operations Team – TBA

13.2.2 Local Fire and Medical Dept. – TBA

13.3 Safety Equipment at Operations Site

13.3.1 First Aid Kit

13.3.2 Fire Extinguisher

13.4 Procedure in Event of Incident/Accident

13.4.1 The PIC will take command of the situation until resolved

13.4.2 The PIC will contact the proper emergency services if required

13.4.3 The UAV will return to land as soon as safely possible.

13.4.4 The operations team will ensure spectators will remain clear of operations area.

13.4.5 The operations team will shut down all operations gear as required:

13.4.5.1There is no equipment on the ground station that needs to be urgently shut down.

13.4.5.2 The UAV power should be disconnected as soon as practical, however other actions in this list should be done by level of importance as the situation deems.

13.4.6 First Aid will be administered if and as required.

13.4.7 Firefighting will be performed only if it can be safely performed given the equipment available and ability of the personnel or in the event of a life threatening situation. Otherwise firefighting shall wait for proper emergency services. Fire is considered highly unlikely given the size of the UAV and the use of electric motors.

EXHIBIT A - EXEMPTION / WAIVER REQUESTS

Regulations Waiver Request and Procedures for ARMDS		
Regulation	**Title and Description**	**Safety Equivalent**
Note:	For exemptions that do not apply as the operation is outside the US no waiver or exemption is needed per CFR 91.101	Best practices will be applied under ICOA rules when applicable
91.1(b)(2)	Civil aircraft manual, carried on aircraft	Manual will be carried by operator(s) on ground at control station.
91.9(c)	Civil aircraft marking in accordance with FAR 45	Unmanned system will be marked with serial number and non-government marking
91.103(b)(1)	Preflight action, use of takeoff and landing distance data	Requires 10 meters by 10 meter platform
91.103(b)(2)	Preflight action, use of performance data if no flight manual is required	Flight manual will be maintained by PIC on the ground and performance data will be will be analyzed to enhance future performance
91.105(a)(2)	Flight crewmembers at stations, seat belt fastened	There are no seatbelts because there are no passengers or on board pilots
91.109(a)	Flight instruction, dual controls required	Flight control are on a ground station and will be operated by a certified pilot with a spotter verifying control
91.203(a)(1)	Civil aircraft: certifications required airworthiness certificate on board	Appropriate documentation will be available with operations crew on site.
91.203(a)(2)	Civil aircraft: certifications required, registration certificate on board	Appropriate documentation will be available with operations crew on site.
91.207(a)(2)	Emergency locator transmitters, attached to the airplane	No ELT is available for an unmanned system this size. All operation will be conducted within line of sight to operators to ensure no loss of

		visual contact
91.211(a)	Supplemental oxygen for flight crew	Not Applicable
91.405(a)	Maintenance required, inspection of aircraft	All maintenance of unmanned system will be conducted as specified by the manufacturer. Maintenance will be documented on flight manual which will be in possession of operators at all times.
91.405(b)	Maintenance required, documentation and return to service	All maintenance of unmanned system will be conducted as specified by the manufacturer. Maintenance will be documented on flight manual which will be in possession of operators at all times.
91.407(a)(1)	Operation after maintenance, return to service by appropriate person	All maintenance of unmanned system will be conducted as specified by the manufacturer. Maintenance will be documented on flight manual which will be in possession of operators at all times.
91.409(a)(1)	Inspections, annual, within preceding 12 months	No flight instruction for hire will be performed
91.409(b)	Inspections, 100 hour, if flight instruction for hire is provided	All maintenance of unmanned system will be conducted as specified by the manufacturer. Maintenance will be documented on flight manual which will be in possession of operators at all times.
91.417(a)	Maintenance records to be maintained by owner or operator	All maintenance of unmanned system will be conducted as specified by the manufacturer.

		Maintenance will be documented on flight manual which will be in possession of operators at all times.

FAR 91 REGULATIONS WHICH MAY REQUIRE WAIVER		Safety Equivalent
NOTE: SUBPART J Waivers	Administrator may issue a certificate of waiver authorizing the operation of aircraft in deviation from any rule listed in this subpart if the administrator finds that the proposed operation can be safely conducted under the terms of the certificate of waiver.	
61.113	Private pilot privileges and limitations: Pilot in command	We will be using a private pilot for most surveying however an exemption is requested for testing periods when an engineer from our staff will be needed to make necessary adjustments. All flights will be incidental to Persistence Mining Inc.'s business; and will not carry passengers or property for compensation or hire.
91.107	Use of Safety Belts	Aircraft does not carry any passengers or a pilot
91.111	Operating near other aircraft	ARMDS will be operated below commercial airspace in remote areas more than 5 NM from all commercial airfields
91.113	Right -of-way rules: Except Water operations	Flight plans will be registered prior to flights and will be below standard flight levels and a maximum of 400 feet AGL
91.115	Right -of-way rules: Water operations	Flight plans will be registered prior to flights and will be below standard flight levels and a maximum of 40 feet above the ground
91.117	Aircraft Speed	Air speeds will be at a rate lower than 50 MPH
91.119	Minimum safe altitudes: General.	All flights will be between 50 ft. and 400 ft. AGL with an average of 100 feet AGL, except during take-off and landing
91.121	Compliance with ATC clearances and instructions	IRF clearance will not need to be granted by a tower due to the remote location of the launch sites away from conventional airfields. There is no station within the area prescribed in this section, the current reported altimeter setting of an appropriate

		available station. All operations will be conducted under line of sight rules at or below 400 feet AGL
91.125	ATC light signals	There will not be any signals in the launch areas to comply with
91.126	Operating on or in the vicinity of an airport in class G airspace	ARMDS will not be operated in class G airspace
91.127	Operating on or in the vicinity of an airport in class E airspace	ARMDS will not be operated within class E airspace
91.29	Operations in Class D airspace	ARMDS will not be operated within class D airspace
91.13	Operations in Class C airspace	ARMDS will not be operated within class C airspace
91.131	Operations in Class B airspace	ARMDS will not be operated within class B airspace
91.133	Restricted and Prohibited areas	ARMDS will not be operated in restricted or prohibited airspace
91.135	Operations in Class A airspace	ARMDS will not be operated in class A airspace
91.137	Temporary Flight Restrictions	1 SM during the day and 3 at night with no clouds
91.153	VFR flight plan: information required	1 SM during the day and 3 at night with no clouds Does not apply because below the 400 foot AGL ceiling,
91.155	VFR weather minimums	Below 400 feet
91.157	Special VFR weather minimums	1 SM during the day and 3 at night with no clouds
91.159	VFR cruising altitude or flight level	Between 40Ft. AGL and 400 feet AGL
91.169	IFR flight plan: information required	We will file a flight plan prior to flight
91.173	ATC clearance and flight plan required	We will file a flight plan prior to fly at low altitudes
91.175	Takeoff and landing under IFR	No IRF will be managed by the ground pilot in remote areas
91.177	Minimum altitude for IR operations	The drone will be flown at altitudes of 50 ft. and 400 ft. AGL The drone will need to stay well below the normal flight altitude for a

		regular manned aircraft
91.179	IFR cruising altitude or flight level	The drone will be flown at altitudes of 50 ft. AGL to 400 ft. AGL. The drone will need to stay well below the normal flight altitude for a regular manned aircraft
91.185	IFR operations: two-way radio communication failure	The ARMDS is an unmanned vehicle therefore is programmed to return to the launch location in case of communication failure
91.209	Aircraft lights	No flights will occur from sunset to sunrise
91.305	Flight test areas	Will be conducted in remote areas more than 20 NM from any airports
91.313e	Restricted category civil aircraft: Operating limitations	Aircraft will be operated within safety guidelines put forth by the supervisor and will not fly directly over any person or people
91.405(a)	Maintenance required, inspection of aircraft	All maintenance of unmanned system will be conducted after completion if each flight. Maintenance will be documented on flight manual this will be in possession of operators at all times.
91.405 (b)	Maintenance required, documentation and return to service	All maintenance of unmanned system will be conducted after completion if each flight. Maintenance will be documented on flight manual this will be in possession of operators at all times.
91.407	Operation after maintenance, return to service by appropriate person.	All maintenance of unmanned system will be conducted as specified by the Manufacturer. Maintenance will be documented on flight manual which will be in possession of operators at all times
91.515	Flight Altitude rules	Aircraft will only operate with VFR weather minimums
91.7(a).	Civil aircraft airworthiness Certificate	Persistence seeks the requested relief because the ARMDS does not require an airworthiness certificate in accordance with 14 C.F.R. Part 21, Subpart H. Therefore, we will ensure that the ARMDS is in an airworthy condition based upon its compliance with the operating documents prior to every flight, and as stated in the conditions and limitations of our operations manual.

Persistence Mining is a small mining company with headquarters in La Jolla CA. Our personnel have experience operating unmanned systems to provide geological and agricultural surveying data to clients. With our alliance to educators and researchers, the Persistence Mining team will be able to assist researching in mapping and discovering various geographical features that will assist in a number of research areas.

ARMDS is currently working with a large petroleum company to develop the procedures and safety plans to support remote sensing operations on production platforms in the Gulf of Mexico. The purpose of this program is to support enhancing incident response times and improve safety of platform inspections for numerous objectives including, but not limited to:

1. Geo-mapping for explorations
2. Emergency Response Protocols for natural disasters
3. Fluvial Studies
4. Hyper spectral imaging maps

The first phase of the development project will be to decrease the amount of pitch and tilt during flight and turns within a grid pattern

2014-15 year. These inspections will occur in after each flight to guarantee advancements in proceeding flights

Approximate Location of the areas to be surveyed:

1. Remote areas near Hawthorn, Nevada
2. Remote Areas in Playas New Mexico
3. Other remote mining areas
4. Agricultural areas

All operations will be conducted in specified areas with a pre-determined flight plan by personnel who hold current commercial pilot certificates. These PICs will be trained to the highest level and certified to operate by the unmanned system manufacturer.

Through this program Persistence Mining will establish an aerial surveying program for geo-mapping, environmental services support as well as to develop safety procedures and best practices for such operations.

We are requesting exemptions from the Federal Aviation Regulations so this operation can be commercially completed in accordance to all applicable FARs that would pertain to a small unmanned system. It is our team's hope that through exemption from inapplicable regulations Persistence Mining Inc. Will be able to provide the United States government and the FAA a source of performance data from the safe and successful conduct of commercial UAS operations. The remote locations of this request provides a unique opportunity to further the process of UAS integration into the NAS with strict safety and access controls already in place for the locations of the inspections.

Brian Zamudio, Director of Operations

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