Apex Drone Services, LLC

3112 Prestwick Cir Jonesboro AR 72405 (870)530-9610

September 2nd, 2021

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

DEPARTMENT OF TRANSPORTATION
2021 NOV 29 A 9:16
DOCKET OPS

Re: Petition for an exemption to conduct unmanned aircraft systems (UAS) operations and to authorize commercial agricultural services with UAS weighing 55 pounds or more.

A. SUMMARY:

Apex Drone Services, LLC is an agricultural services company. Pursuant to Title 49 USC § 44807 Special authority for certain unmanned aircraft systems and Title 49 USC § 44701(f) Exemptions, and in accordance with 14 CFR § 11.63, Apex Drone Services, LLC Petitioner does hereby respectfully request expedited approval and necessary exemption from the listed Code of Federal Regulations (CFR) for the purpose of agricultural modernization by operating DJI Agras T20 Unmanned Aircraft Systems (UAS) weighing more than 55 pounds but less than 105 pounds, for aerial agricultural vegetation and pest control, and farm management. All operations will be conducted under the conditions herein outlined, established by the Federal Aviation Administration (FAA), as required by Title 49 USC § 44807.

The proposed operation in this Petition for Exemption is similar in nature and structure as to several which are currently operating with said exemptions. This Petition for Exemption has been modeled from, indicates the same conditions, and makes the same plea as the Costal Spray Exemption No. 18200.

As described more fully below, the requested exemption would permit the operation of the DJI T-20 by petitioner, under controlled conditions in predetermined airspace that is,
1) Limited in scope;
2) Controlled as to access by mission essential and properly trained personnel only.

Grant of the requested exemption is based upon direction expressed within Title 49 USC § 44807; the added authority granted by the Act, as amended; an equivalent level of safety regarding flight operations as expressed herein, and significant cost savings achieved by transitioning from traditional manned aerial resources to UASs. The petitioner respectfully requests that the FAA grant the requested exemption without delay. Petitioner will operate the DJI Agras T20 while keeping the documents required by the regulations at the ground control station and immediately accessible to the Pilot in Command (PIC).

The relief requested in this Petition is considered a summary grant as the DJI Agras T20 unmanned aircraft has been recently approved by the FAA for commercial agricultural related services in numerous other exemptions (Exemption No. 11400, 18798, 11177, 11264, 11262, et. al.). It is also analogous that granted in Exemption No. 18200.

Apex Drone Services, LLC seeks relief granted similar to that of Exemption No. 18200.

The name and address of the Petitioner is: Apex Drone Services, LLC

The primary contact for this petition is:
Jonathan Cottingham

Apex Drone Services, LLC

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Apex Drone Services, LLC
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B. BACKGROUND OF PETITIONER

Apex Drone Services, LLC is a small UAS operator which will begin agricultural operations with the grant of exemptions requested in this plea. Apex Drone Services, LLC has served the Northeast Arkansas community for over a decade and is well associated with the community's needs and values. The rural farming community has indicated that it will welcome this innovation and the increased efficiency and safety which Apex Drone Services, LLC will provide. Apex Drone Services, LLC will serve the rural farming community if granted this Petition of Exemption.

C. BACKGROUND OF MANUFACTURER

DJI is a global leader in developing and manufacturing civilian drones and aerial imaging technology for personal and professional use. DJI was founded and is run by people with a passion for remote-controlled helicopters and experts in flight-control technology and camera stabilization. The company is dedicated to making aerial photography and filmmaking equipment and platforms more accessible, reliable, and easier to use for creators and innovators around the world. DJI's global operations currently span across the Americas, Europe, and Asia, and its revolutionary products and solutions have been chosen by customers in over 100 countries for applications in filmmaking, construction, inspection, emergency response, agriculture, conservation, and many other industries.

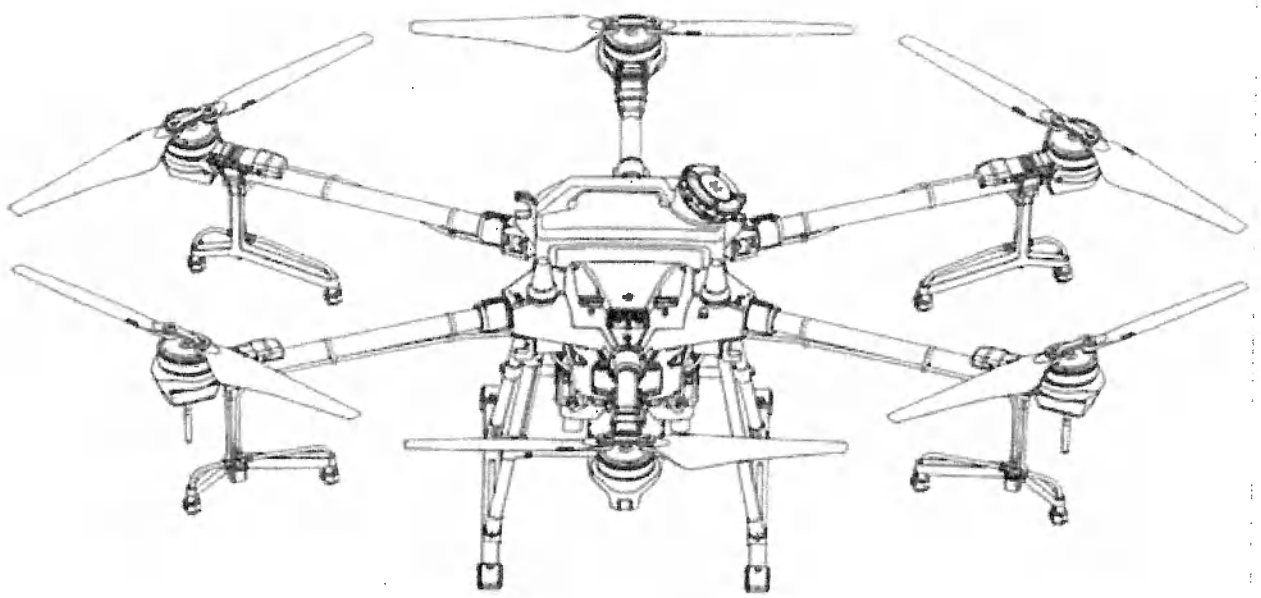
Established to produce DJI's innovative products safely and responsibly, DJI's wholly owned subsidiary Shenzhen Da-Jiang Baiwang Technology Co., Ltd. is a high-tech manufacturing facility specializing in unmanned aerial vehicles. In 2016, Dajiang Baiwang passed the ISO 9001:2015 Quality Management System Certification and in 2017 passed the SGS ISO 14001:2015 Environmental Management System Certification.

As of July 23, 2021, DJI has delivered over 50,000 agricultural UAS worldwide and sprayed over 33,333,333 hectares of land.

D. UAS DISCRIPTION

The DJI Agras T20 can conduct autonomous operations over a variety of terrains, such as broadacre farmlands, terraces, and orchards. New features, like an omnidirectional digital radar have increased stability and flight safety levels providing users with highly efficient results. The DJI Agras T20 features a payload of 20 L coupled with a spray width of 7 m making the operation more cost effective and efficient. Being a comprehensive spraying system, the DJI Agras T20 allows users to set flight and operation parameters easily. With a built-in RTK centimeter-level positioning system and RTK dongles, centimeter-level waypoint recording is enabled, strengthening operations greatly and ensuring precision spraying. The DJI Agras T20 comes equipped with 8 nozzles and high-volume pumps that can spray at a rate of up to 6 L/min. A highly optimized wind field produces droplets ideal in size and consistency. The DJI Agras T20 is also equipped with a new 4-channel electromagnetic flow meter, which monitors and controls four hoses individually, ensuring an efficient flow rate for each nozzle. The T20 is equipped with an omnidirectional digital radar, which is able to detect obstacles from all horizontal directions. It can also automatically circumvent obstacles while flying over various terrains, ensuring much higher levels of operational safety than non-automated systems. With this radar the DJI Agras T20 can adapt to most environments due to its strong resistance to dust and water. The DJI Agras T20 also comes with a real-time FPV camera and two searchlights, providing users with comprehensive live views even at night. The DJI Agras T20 folds and unfolds making it more portable than other agricultural drones. The spray tank and battery are both swappable thereby reducing downtime and increasing workflow significantly while reducing agricultural operational costs. All core

modules are IP67 rated. They can also withstand splashes when cleaning the aircraft body which can be done easily with water. Thanks to a 4-channel electromagnetic flow meter, 4 electromagnetic exhaust valves, and replaceable diaphragms for pumps calibration and maintenance are more cost effective than other applications. Air bubbles can be discharged with a single press of a button. DJI has successfully elevated the performance of the T20 thanks to the new programmable Agras Smart Controller 2.0 and the DJI Agras app. The user interface runs smoothly and is intuitive. The smart controller comes with an ultra-bright 5.5-inch display which is visible even under strong sunlight. It also supports external battery packs and can last twice as long as other remote controllers which allows for lengthy or heavy workloads. The Spreading System 2.0 makes the DJI Agras T20 more efficient by utilizing a payload of 16 L and a dispense rate of up to 15 kg/min. For direct seeding with grains 0.5-5 mm in size, the Spreading System 2.0 performs 70 times faster than manual operations. This improved form of planting is designed for multiple application scenarios such as grassland reseeding, granular fertilizer spreading, and the spreading of feed for fish and shrimp. Installation of the system can be completed in under three minutes further reducing operating costs and the overall cost of food to consumers. The 3D flight route solution allows navigation through difficult terrain. The Phantom 4 RTK scans and maps target areas making it easier to identify all aspects of the field. In Orchard mode 3D flight routes can be generated based on the shapes of each tree after they are identified. This satisfies the need for field surveys as required by 14 CFR 137. Agricultural solution packages are designed to monitor crop health and generate variable treatment procedures. The P4 Multispectral scans target areas and generates multispectral charts that provide actionable insights into crop health and help formulate variable spraying and seeding maps. Through the DJI Agriculture Management Platform users can access DJI Terra shapefiles and apply them to spraying and seeding operations. UAS such as the DJI Agras T20 allow more precise, efficient, and cost effective crop management and are critical to the next generation of agriculture



DJI Agras T20

Apex Drone Services, LLC

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Specifications:

FLIGHT PARAMETERS

Total Weight (Excluding battery): 21.1 kg
Standard Takeoff Weight: 42.6 kg
Max Takeoff Weight: 47.5 kg (at sea level)
Max Thrust-Weight Ratio: 1.70 (with a takeoff weight of 47.5 kg)
Hovering Accuracy (With a strong GNSS signal): D-RTK enabled: Horizontal: ±10 cm, Vertical: ±10 cm D-RTK disabled: Horizontal: ±0.6 m, Vertical: ±0.3 m (Radar module enabled: ±0.1 m)
RTK/ GNSS Operating Frequency: RTK: GPS L1/L2, GLONASS F1/F2, BeiDou B1/B2, Galileo E1/E5 [1]
GNSS: GPS L1, GLONASS F1, Galileo E1 [1]
Max Power Consumption: 8300 W
Hovering Power Consumption: 6200 W (with a takeoff weight of 47.5 kg)
Hovering Time[2]: 15 min (takeoff weight of 27.5 kg with a 18000 mAh battery) 10 min (takeoff weight of 42.6 kg with a 18000 mAh battery)
Max Tilt Angle: 15°
Max Operating Speed: 7 m/s
Max Flying Speed: 10 m/s (with a strong GNSS signal)
Max Wind Resistance: 8 m/s
Max Service Ceiling Above Sea Level: 2000 m
Recommended Operating Temperature: 0° to 40°C

AIRFRAME

Max Diagonal Wheelbase: 1883 mm
Dimensions: 2509×2213×732 mm (Arms and propellers unfolded) 1795×1510×732 mm (Arms unfolded and propellers folded) 1100×570×732 mm (Arms and propellers folded)

PROPULSION SYSTEM - MOTOR

Stator Size: 100×15 mm
Weight: 666 g

PROPULSION SYSTEM

KV: 75 rpm/v
Max Thrust: 13.5 kg/rotor
Max Power: 2400 W/rotor
Weight (Single propeller): 90 g

PROPULSION SYSTEM - PROPELLERS

Diameter × Pitch: 33×9 in

PROPULSION SYSTEM - ESC

Max Working Current (Continuous): 40 A
Max Working Voltage: 58.8 V(14S LiPo)

FPV CAMERA

FOV: Horizontal: 98°, Vertical: 78°
Resolution: 1280×960 30fps

FPV SPOTLIGHT

Max Brightness: 12 lux at 5 m of direct light

SPRAYING SYSTEM

Spray Tank Volume: Rated: 15.1 L, Full: 20 L
Operating Payload: Rated:15.1 kg, Full:20 kg

SPRAYING SYSTEM - NOZZLE

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Nozzle Model: SX11001VS(standard) SX110015VS(optional) XR11002VS(optional)
Quantity: 8
Max Spray Rate: SX11001VS: 3.6 L/min SX110015VS: 4.8L/min XR11002VS: 6 L/min
Droplet Size: SX11001VS: 130-250 μm SX110015VS: 170-265 μm XR11002VS: 190-300 μm (related to the actual working environment, spraying flow, etc.)
Spray Width: 4-7 m (8 nozzles, at a height of 1.5 - 3 m above crops)

SPRAYING SYSTEM - FLOW METER

Measurement Range: 0.25-20 L/min
Error: < ±2%
Measurable Liquid: Conductivity > 50 μS/cm (Liquids such as water or pesticides that contain water)

HIGH PRECISION RADAR MODULE

Model: RD2428R
Operating Frequency: CE (Europe)/(United States): 24.00 GHz-24.25 GHz MIC (Japan) KCC (Korea): 24.05 GHz-24.25 GHz
Power Consumption: 18W
EIRP: MIC/KCC/CE/FCC: <20 dBm
Altitude Detection & Terrain Follow: Altitude detection range: 1-30 m Stabilization working range:1.5-15 m Maximum slope of hill mode: 35°
Obstacle Avoidance System: Altitude detection range: 1.5-30 m FOV: Horizontal: 360°, Vertical: ±15° Condition: Relative altitude higher than 1.5 m, operation speed lower than 7 m/s Safe distance: 2.5m (distance between the propeller tip and the obstacle after the aircraft stops) Obstacle-avoiding direction: Omnidirectional obstacle sensing operates horizontally and covers 360°
IP Rating: IP67

T20 Intelligent Flight Battery

Model: AB3-18000mAh-51.8V
Weight: 6.4 kg (approximately)
Discharge Rate: 9 C
IP Rating: IP54
Capacity: 18000 mAh
Voltage: 51.8 V

REMOTE CONTROLLER

Model: RM500-AG
OcuSync 2.0 Operating Frequency: 2.4000-2.4835 GHz 5.725-5.850 GHz
OcuSync 2.0 Effictive Transmission Distance(Unobstructed, free of interference): SRRC/MIC/KCC/CE: 3 km NCC/FCC: 5km (Operation height: 2.5 m)
OcuSync 2.0 Transmission Power (EIRP): 2.4 GHz SRRC/CE/MIC/KCC: 18.5 dBm, FCC: 25.5 dBm; 5.8 GHz SRRC/FCC: 25.5 dBm
WIFI Protocol: Wi-Fi Direct, Wireless Display, 802.11a/g/n/ac, and Wi-Fi with 2×2 MIMO is supported
Wi-Fi Operation Frequency Range: 2.4000-2.4835 GHz 5.150-5.250 GHz 5.725-5.850 GHz
WIFI Transmission Power (EIRP): 2.4 GHz SRRC/CE: 18.5 dBm; FCC/MIC/KCC: 20.5 dBm; 5.2 GHz SRRC/FCC/CE/MIC: 14 dBm; KCC:10 dBm; 5.8 GHz SRRC/FCC: 18 dBm; CE/KCC: 12 dBm
Bluetooth Protocol: Bluetooth 4.2

Bluetooth Operating Frequency: 2.4000-2.4835 GHz
Bluetooth Transmission Power (EIRP): SRRC/MIC/FCC/CE/KCC: 6.5 dBm
GNSS: GPS+GLONASS
Display Device: 5.5-inch screen 1920×1090 pixels Brightness: 1000 cd/m² Android System
Random Access Memory, RAM: 4GB LPDDR4
Storage Capacity: ROM 32GB + microSD, supports microSD cards with a capacity of up to 128 GB and R/W speed up to UHS-I Speed Grade 3
HDMI: HDMI 1.4
Supported Aircraft: Agras T20
Power Consumption: 18 W
Operation Temperature Range: -10° to 40°C
Storage Temperature Range: < 1 month: -30° to 60°C 1-3 months: -30° to 45°C, 3-6 months: -30° to 35°C,
> 6 months: -30° to 25°C (Built-in battery power 40% to 60%)
Charging Temperature: 5° to 40°C

REMOTE CONTROLLER - INTERNAL BATTERY
Battery Type: 18650 Li-ion (5000 mAh @ 7.2 V)
Working Time: 2 hours
Charging Time: 2.5 hours (using a standard USB power adapter rated 12 V/2 A)
Power Supply Current/Voltage (USB-A port): 5 V/ 1.5 A
Model: WB37-4920mAh-7.6V

REMOTE CONTROLLER - INTELLIGENT BATTERY
Charge Type: Supports USB power fast charge adapters rated 12 V/2 A
Battery Type: 2S LiPo

Capacity: 4920 mAh
Voltage: 7.6 V
Energy: 37.39 Wh
Charging Temperature: 5° to 40°C
Model: 2 hours

REMOTE CONTROLLER - INTELLIGENT BATTERY CHARGING HUB
Model: WCH2
Input Voltage: 17.3-26.2 V
Output Voltage and Current: 8.7 V, 6 A
Operating Temperature: 5° to 40°C

REMOTE CONTROLLER - INTELLIGENT BATTERY CHARGING HUB POWER ADAPTER
Model: A14-057N1A
Input Voltage: 100 - 240 V, 50/60 Hz
Output Voltage: 17.4 V
Rated Power: 57 W

E. SYSTEM BENEFITS, ENHANCED SAFETY, AND PUBLIC INTEREST

Food production is a critical element of not only survival but the health of a nations's economy. The transition from older forms of crop management is occurring throughout the world with China and Japan leading the way. It is essential that the United States modernize its crop production methods and utilize this new technology. A UAS has

the benefit of being far more efficient, cost effective, and environmentally friendly than older methods of agriculture such as fixed wing aircraft. The widespread use of UAS in the United Sates will not result in a loss of jobs available to the public. Current agricultural aircraft operators will simply transition to UAS from fixed wing aircraft. Furthermore, a UAS poses a much less significant public safety issue than fixed wing aircraft. UAS have automated systems to avoid obstacles and controlled flight into terrain which are the leading causes of agricultural aircraft accidents in the United States. Spraying operations are much more precise which significantly reduces environmental impact due to overspray and loading. Maintenance of UAS is significantly important to the cost effectiveness of these operations. Ten UAS can be purchased for the cost of a hot-section (overhaul) on a turbine fixed wing aircraft. Lower torque and aerodynamic pressure on UAS allow for simple, cost effective, parts replacement at much greater intervals than conventional farm equipment. Lower operating speeds, mass, and the carriage of no combustable chemicals further dramatically increase public safety over conventional agricultural equipment.

Flight Modes

P-mode (Positioning): The aircraft utilizes GNSS or the RTK module for positioning. When the GNSS signal is strong, the aircraft uses GNSS for positioning. When the RTK module is enabled and the differential data transmission is strong, it provides centimeter-level positioning. The aircraft reverts to Amode when the GNSS signal is weak. The aircraft will fly in P-mode by default.

A-mode (Attitude): GNSS is not used for positioning and the aircraft can only mainta in altitude using the barometer. The aircraft enters A-mode only when there is weak GNSS signal or when the compass experiences interference. The flight speed in A-mode depends on its surroundings such as the wind speed.

In A-mode, the aircraft cannot position itself and is easily affected by its surroundings, which may result in horizontal shifting. Use the remote controller to position the aircraft. Maneuvering the aircraft in A-mode can be difficult. Avoid flying in confined spaces or in areas where the GNSS signal is weak. Otherwise, the aircraft will enter A-mode, leading to potential flight risks. Land the aircraft in a safe place as soon as possible.

System Data Protection

In Route or Route A-B operation mode, the System Data Protection feature enables the aircraft to retain vital system data such as operation progress and breakpoints after the aircraft is powered off to replace a battery or refill the spray tank. Follow the instructions in Operation Resumption to resume the operation after restarting the aircraft. During Route operations, in situations such as when the app crashes or the remote controller disconnects from the aircraft, the breakpoint will be recorded by the flight controller and can be recovered in the app once the aircraft is reconnected. Go to Operation View, select, then Advanced Settings, and tap Continue Unfinished Task. Recall the operation in Executing tag in operation list.

Obstacle Avoidance

Obstacle avoidance is used in the following two scenarios:

1. The aircraft begins to decelerate when it detects an obstacle is 15 m away and hovers in place when 2.5 m away from the obstacle. Users can not accelerate in the direction of the obstacle but can fly in a direction away from the obstacle.
2. The aircraft immediately brakes and hovers if it detects an obstacle nearby. Users cannot control the aircraft when it is braking.

When the aircraft is hovering, it is in Obstacle Avoidance mode. Users can fly in a direction away from the obstacle to exit Obstacle Avoidance mode and regain full control of the aircraft.

Empty Tank
A prompt appears on the new DJI Intelligent RC 2.0 Smart Controller and the aircraft hovers in place when the spray tank is empty. In Route, A-B Route, and ManualPlus operation modes the aircraft can also be set to ascend or RTH instead of hovering.

Return to Home (RTH)
There are two types of RTH: Smart RTH and Failsafe RTH.

Smart RTH
Press and hold the RTH button on the remote controller when GNSS is available to enable Smart RTH. Both Smart and Failsafe RTH use the same procedure. With Smart RTH, you may control the speed and altitude of the aircraft to avoid collisions when returning to the home point. The aircraft status indicators will show the current flight mode during RTH. Press the RTH button once or toggle the pause switch to exit Smart RTH and regain control of the aircraft.

Failsafe RTH is automatically activated if the remote controller signal is lost for more than three seconds, provided that the home point has been successfully recorded, the GNSS signal is strong (the white GNSS icon), and the RTK module is able to measure the heading of the aircraft. The RTH continues if the remote controller signal is recovered, and users can control the aircraft using the remote controller.
Press the RTH button once or toggle the pause switch to cancel RTH and regain control of the aircraft.
There are two ways to set a home point:
1. Set the current coordinates of the aircraft as the home point.
2. Set the current coordinates of the remote controller as the home point.

RTH Button
Press and hold the RTH button to bring the aircraft back to the last recorded home point. The LED around the RTH Button blinks white during RTH. Users can control aircraft heading while it flies to the home point. Press this button again to cancel RTH and regain control of the aircraft.

DJI Intelligent RC 2.0 Smart Controller for the T-20 DJI Smart Controller is designed for agricultural applications and is able to display the system status and configure various settings. After planning a field via the intelligent operation planning system of the app, the aircraft can operate automatically following the pre-planned flight route.

Task Management
1. View planned fields and operation progress. You can synchronize the local data with the data on the DJI AG Platform.
2. User Info: View account information.
3. Aircraft Info: View the information of the connected aircraft such as the firmware version.
4. General Settings: Tap for settings such as units of measurement, network diagnosis, and Android system settings.
5. More: Includes FAQ and available firmware update.
6. Aircraft Connection Status: Shows if the aircraft is connected to the remote controller.
7. Plan a Field | Execute Operation

Obstacle Avoidance during RTH
In an optimal operating environment, obstacle avoidance during RTH is available. If there is an obstacle Within 20 m of the aircraft, the aircraft decelerates and then stops and hovers. If the aircraft comes within 6 m of the obstacle while decelerating, the aircraft stops, flies backward to a distance of approximately 6m from the obstacle, and hovers.

The aircraft exits the RTH procedure and waits for further commands.

Landing Protection Function

Landing Protection activates during auto landing. The procedure is as follows:

1. After arriving at the home point, the aircraft descends to a position 3 m above the ground and hovers.
2. Control the pitch and roll sticks to adjust the aircraft position and make sure the ground is suitable for landing.
3. Pull down the throttle stick or follow the onscreen instructions in the app to land the aircraft.

DBF Imaging Radar

The all-new DBF imaging radar works during both day and night, without being affected by light or dust. In an optimal operating environment, the radar module can predict the distance between the aircraft and the vegetation or other surfaces in forward, rear, and downward directions to fly at a constant distance to ensure even spraying and terrain following capability. The DBF imaging radar can also detect obstacles 30 m away from the aircraft. The radar module adopts digital beam forming technology, which supports 3D point cloud imaging that effectively senses the environment and helps to circumvent obstacles in both Route and A-B Route operation modes. In addition, radar module limits the descent speed of the aircraft according to the distance between the aircraft and ground, to provide a smooth landing.

The altitude stabilization and obstacle avoidance functions of the radar module are enabled by default, and can be disabled in the app. When enabled, the aircraft flies above the vegetation at a constant spraying distance in Route, AB Route, and Manual Plus operation modes. In Manual operation mode, the radar module can also measure the spraying distance above the vegetation or other surfaces, but the aircraft is not able to fly at a constant spraying distance. The obstacle avoidance function can be used in any mode. Auto Bypass is disabled by default. Users can enable it in the app.

The horizontal detection range is ±50° and the vertical detection range is 0° to 10°.

Low Voltage and Battery Warnings

The aircraft features a low battery warning, critical low battery warning, and critical low voltage warning.

1. Low Battery Warning: The aircraft status indicators slowly blink red. Fly the aircraft to a safe area and land it as soon as possible, stop the motors, and replace the batteries.
2. Critical Battery Warning or Critical Voltage Warning (the battery voltage is lower than 47.6 V): the aircraft status indicators rapidly blink red. The aircraft begins to descend and land automatically. Users can set the threshold of low battery warnings.

Remote Controller Profile

The remote controller uses the DJI OcuSync 2.0 dual-band image transmission system, which has a maximum control distance of up to 3.11 mi (5 km). It includes a dedicated, Android-based display that runs the DJI Intelligent RC 2.0 Smart Controller independently for operation planning and aircraft status display. Its Multi-Aircraft Control mode can be used to coordinate the operation of up to five aircraft at the same time to improve operation efficiency. Intelligent Battery while the remote controller is still powered on and in use. The device enters Sleep mode to save power. Users are then required to replace the Intelligent Battery within three minutes, or the remote controller powers off.

Plan a Field

Tap the button and select planning method to plan a field.

Execute Operation
Tap to enter Operation View to view the aircraft status, configure settings, and switch between different operations modes.

Flight Limits and Geo Zones
Unmanned aerial vehicle (UAV) operators should abide by the regulations from self-regulatory organizations such as the International Civil Aviation Organization, the Federal Aviation Administration, and their local aviation authorities. For safety reasons, flight limits are enabled by default to help users operate this aircraft safely and legally. Users can set flight limits on height and distance.
When operating with a strong GNSS signal, the height and distance limits and GEO Zones work together to monitor flight. With a weak GNSS signal, only the height limit prevents the aircraft from going above 30 meters. GEO Zones are divided into different categories. All GEO Zones are listed on the DJI official website at http://www.dji.com/flysafe.

Flight Recording of all flights
Flight data shows a real-time video of all operator control input, GPS statuses, vibrate, shake and motor balance statuses along with battery voltage and all other critical telemetry data allowing operator to fully track entire history. All flights are automatically saved on the GCS. This further adds to safety for operator and VO training as operator caused issues can be quickly identified. Further, it allows for remote diagnostics and has a financial benefit not requiring aircraft and components to be unnecessarily shipped.
High Visibility LED Aviation Lighting: Long-range visible, high intensity LED strobes.

F. REGULATORY BASIS FOR PETITION AND REGULATIONS FROM WHICH EXEMPTION IS SOUGHT

1. 49 U.S.C § 44807

The Special Authority for Certain Unmanned Systems (49 USC § 44807) grants the Secretary of Transportation the authority to use a risk-based approach to determine whether an airworthiness certificate is required for a drone to operate safely in the NAS. Under this authority, the Secretary may grant exemptions to the applicable operating rules, aircraft requirements, and pilot requirements for a specific operation on a case-by-case basis. The Special Authority for Certain Unmanned Systems (49 U.S.C. § 44807) grants UAS operators safe and legal entry into the NAS upon consideration of its size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight. The FAA further may find that the UAS does not require "airworthiness certification under section 44704 of title 49, United States Code."

2. 49 U.S.C. § 44701

The FAA is further authorized to grant exemptions from its safety regulations and minimum standards under 49 USC § 44701 ("Section 44701") "if the Administrator finds the exemption is in the public interest." Section 44701(f) (authorizing the grant of exemptions from safety regulations and minimum standards under Section 44701(a) and (b) and Sections 44702 - 44720). Under 49 USC § 44701(f), "Exemptions - The Administrator may grant an exemption from a requirement of a regulation prescribed under subsection (a) or (b) of this section or any of sections 44702 - 44716 of this title if the Administrator finds the exemption is in the public interest."

For the reasons addressed herein, this Petition qualifies for expedited approval of Petitioner's request for exemption under both 49 USC § 44807 and 49 USC § 44701.

The following CFR sections are those to which Apex Drone Services, LLC is seeking exemption. Included in the supporting documentation for this Petition for Exemption is the Apex Drone Services, LLC General Operations

Manual which outlines additional safety measures taken by the petitioner which meet or exceed those required under Title 14 CFR. The General Operations Manual is written to the standards set which are required of 14 CFR Part 135 Air Taxi operators who are responsible for safe transportation of cargo and passengers through the National Airspace System. Safety operations are thoroughly outlined and required of all persons involved in the operations of the petitioner.

Furthermore, in reference to the Federal Aviation Administration; Report to Congress: Unmanned Aircraft Systems and Chemical Aerial Application, FAA Reauthorization Act of 2018, Public Law 115-254, Section 361, dated July 2020 none of the subsections of 14 CFR Part 137 from which Apex Drone Services, LLC is requesting exemption are indicated as necessary to UAS agricultural aircraft operators. This indicates a consensus by the FAA with those requesting such exemptions that such issuance is within the FAAs high standards for public safety.

To expedite the FAA's safety assessment of the proposed UAS operations, except where explicitly noted, Apex Drone Services, LLC agrees to conduct the proposed operations in accordance with the same applicable conditions and limitations ("Limitations") included in the Coastal Spray Exemption, Exemption No. 18200.

Apex Drone Services, LLC seeks exemption from the following interrelated provisions of 14 CFR Parts 61, 91, 107, and 137:

CFRs pertaining to Certification: Pilots, Flight Instructors, and Ground Instructors

<u>14 CFR § 61.3(a)(1)(i) Requirement for certificates, ratings, and authorizations:</u>

The petitioner will conduct the proposed operations under 14 CFR part 91, rather than under Part 107. In general, Part 91 is predicated on the presumption that the pilot in command conducting an operation under part 91 holds an airman certificate under part 61. As a result, the FAA has determined granting exemption from the requirement of § 61.3(a)(1)(i) to require a person holding a remote pilot in command certificate (with the appropriate training and demonstration of knowledge and skills required by this exemption) to conduct the operations to which this exemption applies will ensure clarity.

The statutory obligation for an airman certificate is codified at 49 USC § 44711(a)(2). Pilots who conduct operations under this exemption with a remote pilot in command certificate would comply with § 44711(a)(2), as the FAA described in the operation and Certification of Small Unmanned Aircraft Systems final rule; 81 FR 42064, 42088-89 (June 28, 2020). The general requirements for all airmen include eligibility, aeronautical knowledge, and Transportation Security Administration (TSA) vetting. Given that the operation would occur only after airmen who hold a current remote pilot in command certificate have received specific training, have visited the area of operation and are fully capable of using the tools available to prepare for the operation, conduct comprehensive preflight actions, and conduct the operation only in a limited geographical area, the FAA has previously determined that a remote pilot certificate issued under 14 CFR Part 107 provides the FAA sufficient assurance of the pilots' qualifications and abilities to perform the duties related to the operations authorized under this exemption. The remote pilot in command certificate confirms the petitioner's eligibility, secures TSA vetting, and ensures the PIC has the requisite aeronautical knowledge for operating the UAS within the National Airspace System.

Remote pilots conducting operations under part 107 must complete a detailed aeronautical knowledge test, unless they already hold a certificate under 14 CFR Part 61 and meet the flight review requirements specified in 14 CFR § 61.56. As a result, all such pilots will have the requisite aeronautical knowledge that is a key component of safe completion of all operations that will occur under this exemption. In this regard, the FAA addressed the applicable parts of § 61.125, Aeronautical knowledge, in the remote pilot in command certificate requirements. For the reasons

discussed below, this same rationale espoused by the FAA in previous approved exemptions, combined with Apex Drone Services, LLC's proposed safety mitigations outlined in its General Operations Manual, also supports a finding that the proposed operations under the requested exemptions can be conducted without adversely affecting safety.

Operations involving UAS weighing greater than 55 pounds or more create other safety concerns than operations involving small UAS, the unique nature of the proposed operations, including the low-risk rural environments in which the operations will occur, will ensure that safety is not jeopardized. While Part 107 will not apply to the proposed operations, wherever possible, Apex Drone Services, LLC intends to conduct the proposed operations in accordance with Part 107. Moreover, all UAS operations that meet the definition of an "agricultural aircraft operation" will be conducted in accordance with those portions of Part 137 from which Empire Drone Company LLC is not exempted.

CFRs pertaining to General Operating and Flight Rules

14 CFR § 91.7(a) Civil aircraft airworthiness.

The FAA's determined in the Coastal Spray Exemption that the pilot may determine the UAS is in an airworthy condition prior to flight. Apex Drone Services, LLC will operate under a General Operations Manual approved by the FAA for the purpose of addressing safety concerns not yet addressed in the current CFR with regard to UAS operations in the United States. Apex Drone Services, LLC has outlined the necessary actions to provide a level of safety which meets or exceeds those required by 14 CFR § 91.7(a) as defined in their General Operations Manual.

14 CFR § 91.119 Minimum safe altitudes

Apex Drone Services, LLC also seeks an exemption from FAR § 91.119(c) Minimum safe altitudes, to the extent necessary to allow UAS operations over other than congested areas at altitudes lower than those permitted by the rule. The ability to operate at those altitudes is one of the key benefits of using UAS for the proposed agricultural activities. An equivalent or greater level of safety will be achieved given the size, relatively light weight, and slow speed of the UAS, as well as the controlled location where the operations will occur. Apex Drone Services, LLC generally intends to maintain an operating altitude of below 100 feet AGL during operations. That altitude is only increased when exercising caution and issuing a return-to-launch command to the UAS, which causes the UAS to ascend to an altitude of 100 feet AGL before returning home. These low altitudes promote a decreased risk of collision with other aircraft without posing any increased risk to persons or property in the air and on the ground, including participating and non-participating personnel and the other UAS.

14 CFR § 91.121 Altimeter settings

Other aircraft operations require an altimeter set to the elevation of the departure airport or barometric pressure. In the Coastal Spray Exemption, the FAA stated that an equivalent level of safety to the requirements of FAR § 91.121 can be achieved in circumstances where the PIC uses an alternative means for measuring and reporting UA altitude, such as global positioning system (GPS). All of Apex Drone Services, LLC UAS will be equipped with GPS and other equipment for measuring and reporting UAS altitude. Additionally, the PIC will check the UAS altitude reading prior to each departure which will act as a verification of the function and as a system redundancy. Consistent with previously granted exemptions, these requirements ensure that an equivalent level of safety will be achieved and an exemption from the requirements of FAR § 91.121 is therefore necessary and appropriate.

Apex Drone Services, LLC

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14 CFR § 91.151(b) Fuel requirements for flight in VFR conditions

An exemption from FAR § 91.151(b) Fuel requirements for flight in VFR conditions is necessary as the FAA has previously determined that a requirement prohibiting the PIC from beginning a UAS flight unless (considering wind and forecast weather conditions) there was enough available power for UAS to operate for the intended operational time and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater. This is strengthened by the fact that a UAS can be landed in a considerably smaller area than a fixed wing or rotorcraft aircraft. Additionally, due to the low altitudes and that no passengers are being carried, a power loss would not consuetude a catastrophic event and would ensure an equivalent level of safety.

14 CFR § 91.405(a) Maintenance required
14 CFR § 91.407(a)(1) Operation after maintenance, preventive maintenance, rebuilding, or alteration
14 CFR § 91.409(a)(1) and (2) Inspections
14 CFR § 91.417(a) and (b) Maintenance records

These regulations specify maintenance, inspection, and records standards in reference to FAR § 43.6. An exemption from these regulations is needed because Part 43 and these sections only apply to aircraft with an airworthiness certificate, which the UAS to be operated under this exemption will not have, and because compliance with these regulatory provisions in the context of UAS operations is not feasible.

An equivalent level of safety will be achieved because maintenance, inspections, and records handling will be performed in accordance with the manufacturer's manual and any required manufacturer safety or service bulletins. Moreover, the PIC will conduct a pre-flight inspection of the UAS and all associated equipment to account for all discrepancies and/or inoperable components. Maintenance will be performed and verified to address any conditions potentially affecting the safe operation of the UAS and no flights will occur unless and until all flight critical components of the UAS have been found to be airworthy and in a condition for safe operation. A functional test flight will also be conducted in a controlled environment following the replacement of any flight critical components and, as required by the operating documents, the PIC who conducts the functional test flight will make an entry in the UAS aircraft records of the flight. Functional flight tests will not involve the carriage of hazardous materials, will not be a multi-vehicle operation, and the vehicle will have an all-together weight below 55 pounds during flight testing. In addition, the operator will be required to follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the UAS and its components. Along with the preflight checklists and Apex Drone Services, LLC General Operations Manual requirements, Apex Drone Services, LLC believes an equivalent level of safety is met and that equipment at risk of failure can be safely identified before flights occur.

In the Coastal Spray Exemption, the FAA determined that the proposed UAS operations required exemption from FAR § 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), and that the achievement of an adequate level of safety required certain conditions and limitations. Apex Drone Services, LLC has proposed in this Petition a number of Limitations related to maintenance, inspections, and records which it believes provide a level of safety at least equivalent to that provided by FAR § 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b). For this reason, and consistent with the exemption granted from these sections in the Coastal Spray Exemption, Apex Drone Services, LLC requests an exemption from these sections, subject to the Coastal Spray limitations, without having to perform the inspections and maintenance items required by FAR §§ 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b).

CFRs Pertaining to Small Unmanned Aircraft Systems

14 CFR § 107.36 Carriage of hazardous material.

While the operation of UAS within the National Airspace System maintain a higher level of safety than other aircraft due to the lack of flammable chemicals aboard operations under 14 CFR Part 137 require the carriage of material which may present a hazardous impact upon humans, animals, and the ecosystem. UAS agricultural operations allow for a significantly lower chance of contamination. UAS have been utilized in thousands of safe agricultural operations. Apex Drone Services, LLC does not intend to carry any material other than that which is distributed in agricultural operations as defined in their General Operations Manual. The Exemption granted to Coastal Spray, Exemption No. 18200, demonstrates that the carriage of agricultural chemicals by UAS is safe.

CFRs Pertaining to 14 CFR § 137 Agricultural Aircraft Operations

Apex Drone Services, LLC seeks exemptions to the following subsections of 14 CFR Part 137 as the rule which was originally written in 1965 does not reference UAS. However, exemptions to this part have proven safe and support the aviation community, the agricultural community, and critical food supplies. The Apex Drone Services, LLC General Operations Manual, and this plea, address the issues for which each rule was created to indicate a level of safety meeting or exceeding current standards.

14 CFR § 137.19(c) Certification requirements
14 CFR § 137.19(d) Certification requirements
14 CFR § 137.19(e)(2)(ii)(iii)-(v) Certification requirements

Proposed operations of Apex Drone Services, LLC are identical to that previously approved by the FAA in Exemption No.17936. Consistent with the FAA's prior analysis, compliance with the requirements of Part 107, subpart C, the additional knowledge and applicable skill requirements in FAR § 137.19(e)(1) and (2)(i), (iv) and (vi), and compliance with the training requirements in Apex Drone Services, LLC's General Operations Manual will ensure that an equivalent, or higher, level of safety will be demonstrated.

<u>14 CFR § 137.31(a) and (b) Aircraft requirements</u>

In Exemption No. 18200, the FAA granted Coastal Spray an exemption to 14 CFR § 137.19(d), Certification requirements, and 14 CFR § 137.31(a), Aircraft requirements, as UAS do not require an airworthiness certificate and are Commercially Available Off The Shelf (COTS) devices subject to fewer mechanical discrepancies and a higher level of system safety. No properly installed shoulder harness is necessary for un unmanned vehicle.

<u>14 CFR § 137.33(a) and (b) Carrying of certificate</u>

The purpose of this rule is to ensure that each operator of an aircraft engaged in aerial agricultural operations can present the operating certificate when challenged. The facsimile shall be presented for inspection upon the request of the Administrator or any Federal, State, or local law enforcement officer. As there is no person aboard a UAS, contact with the operator is warranted and the FAA allows for other certificates "shall be kept available for inspection at the base from which the dispensing operation is conducted." As indicated previously, an airworthiness certificate is not issued to UAS.

<u>14 CFR § 137.41(c) Personnel</u>

As described above the requirements of this subsection are particular to manned aircraft and are not offered as extensions of 14 CFR Part 107 certifications. The flight maneuvers, knowledge, and skills required for operations under this exemption are specific to those required by 14 CFR Parts 91, 107, and 137.

<u>14 CFR § 137.42 Fastening of safety belts and shoulder harnesses</u>

No properly installed shoulder harness is necessary for un unmanned vehicle.

G. SUPPORTING DOCUMENTATION

In support of this Petition for Exemption, Apex Drone Services, LLC will submit the following associated operating documents:

1. Apex Drone Services, LLC General Operations Manual;
2. Apex Drone Services, LLC Flight Operations and Procedures Manual;
3. DJI AGRAS T20 User Manualv1.2;

4. Apex Drone Services, LLC Preflight, Emergency, and Postflight Checklists.
5. Report to Congress: Unmanned Aircraft Systems and Chemical Aerial Application, FAA Reauthorization Act of 2018, Public Law 115-254, Section 361, July 2020

These documents so listed shall be submitted under a separate cover pursuant to 14 CFR § 11.35(b), as these documents contain proprietary information which Apex Drone Services, LLC has not nor will not share with others. The information contained in this material is not available to the public and its release could result in an adverse economic impact to Apex Drone Services, LLC. This information is protected under the Freedom of Information Act, 5 USC § 552 *et seq.*

H. FEDERAL REGISTER SUMMARY

Pursuant to Title 49 U.S.C. § 44807, Special authority for certain unmanned aircraft systems and 14 C.F.R. Part 11, 49 U.S.C. § 44701(f), and 14 C.F.R. Part 11, the following summary is provided for publication in the FEDERAL REGISTER, should it be determined that publication is needed:

Petitioner seeks an exemption from the following rules in Title 14 of the Code of Federal Regulations:

14 CFR § 61.3(a)(1)(i) Requirement for certificates, ratings, and authorizations;
14 CFR § 91.7(a) Civil aircraft airworthiness;
14 CFR § 91.119 Minimum safe altitudes;
14 CFR § 91.121 Altimeter settings;
14 CFR § 91.151(b) Fuel requirements for flight in VFR conditions;
14 CFR § 91.405(a) Maintenance required;
14 CFR § 91.407(a)(1) Operation after maintenance, preventive maintenance, rebuilding, or alteration;
14 CFR § 91.409(a)(1) and (2) Inspections;
14 CFR § 91.417(a) and (b) Maintenance records;
14 CFR § 107.36 Carriage of hazardous material;
14 CFR § 137.19(c) Certification requirements;
14 CFR § 137.19(d) Certification requirements;
14 CFR § 137.19(e)(2)(ii)(iii)-(v) Certification requirements;
14 CFR § 137.31(a) and (b) Aircraft requirements;
14 CFR § 137.33(a) and (b) Carrying of certificate;
14 CFR § 137.33(a) and (b) Carrying of certificate;
14 CFR § 137.41(c) Personnel; and
14 CFR § 137.42 Fastening of safety belts and shoulder harnesses.

Apex Drone Services, LLC requests an exemption for the purpose of operating Unmanned Aircraft Systems (UAS) weighing greater than 55 pounds, but no more than and 92.59 pounds at sea level, to provide commercial

agricultural services in the United States. The relief requested is like that granted in Exemption No. 18200, to Coastal Spray Co.

This request for exemption shall be for DJI Agras T20 agricultural UAS operated under the Apex Drone Services, LLC General Operations Manual and allow better agricultural production in a safer, more cost effective, manner.

I. CONCLUSION

For the foregoing reasons, Apex Drone Services LLC respectfully requests that the FAA grant this Summary Grant Petition for Exemption. Should you have any questions or need additional information to support this Petition, please do not hesitate to contact the undersigned.

Sincerely,

Jonathan Cottingham
Apex Drone Services, LLC