

BEFORE THE
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C.

Regulatory Docket No. FAA-2016-_____

**PETITION OF VULCAN INC.
FOR EXEMPTION PURSUANT TO SECTION 333
OF THE FAA MODERNIZATION AND REFORM ACT OF 2012
AND 14 CFR PART 11**

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January 7, 2016

**PETITION OF VULCAN INC.
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FAA MODERNIZATION AND REFORM ACT OF 2012 AND 14 CFR PART 11**

Nature of Relief Requested

Pursuant to section 333 of the FAA Modernization and Reform Act of 2012 (Public Law 112-95) and 14 CFR Part 11, **Vulcan Inc.**, 505 Fifth Avenue South, Suite 900, Seattle, Washington 98104, petitions the Federal Aviation Administration for exemption from the requirements of the Federal Aviation Regulations (FARs) listed below, and any other applicable regulations, to the extent necessary to conduct commercial operations with any or all of the four small unmanned aerial systems (UAS) identified in this application. Vulcan's commercial operations will consist of aerial data collection. Vulcan requests that the exemption issued in response to this application remain in effect for a period of two years or until superseded by FAA regulations applicable to the commercial operation of small UAS, whichever is sooner.

Exemption Requested from the Following Regulations

Vulcan Inc. (Vulcan) requests an exemption from the following FARs (14 CFR):

- §§ 61.23(a) and (c)
- §§ 61.101(e)(4) and (5)
- § 61.113(a)
- § 61.315(a)
- § 91.7(a)
- § 91.103(b)(2)
- § 91.105
- § 91.109
- § 91.119(c)
- § 91.121
- § 91.151(a)(1)
- § 91.405(a)
- § 91.407(a)(1)
- §§ 91.409(a)(1) and (2)
- §§ 91.417(a) and (b)
- Any other regulation deemed applicable.

Background of Exemption Request

Section 333 directed the FAA to consider whether certain UAS could operate safely in the national airspace system (NAS) before completion of the rulemaking required under section 332 of Public Law 112-95. In this regard, FAA is required to determine which types of UAS do not create a hazard to users of the NAS or the public or pose a threat to national security in light of 1) the UAS's size, weight, speed, and operational capability, 2) operation of the UAS in close proximity to airports and populated areas, and 3) operation of the UAS within the visual line of sight of the operator. If FAA determines that such UAS may operate safely in the NAS, FAA is directed to establish requirements for the safe operation of such UAS.

In prior exemptions granted to UAS operators, FAA has determined that the types of unmanned aerial systems Vulcan proposes to operate under this exemption meet the criteria of section 333 and, therefore, do not create a hazard to users of the NAS or the public or pose a threat to national security. FAA found additionally that such operations for aerial data collection were in the public interest and that the operations, with appropriate conditions and limitations, could be conducted with a level of safety equivalent to that provided by the rules from which exemption is sought.

Background of Vulcan Inc.

Vulcan is a Seattle-based company engaged in diversified business, investment, and philanthropic activities, managing and overseeing a broad array of projects and companies both domestically and internationally. Vulcan's affiliates include Vulcan Real Estate, the Allen Institute for Brain Science, the Flying Heritage Collection, and the Seattle Seahawks, to name a few. Vulcan is constantly innovating in-house, serving as an incubator for fledgling inventions, ambitious global campaigns, and new philanthropic efforts.

Vulcan pursues numerous projects and investments, whether commercial or philanthropic, inspired by the ideas of its founder, Paul G. Allen. Among these projects is the development of technology employing one or more of the commercially available UAS

platforms identified in this petition for game management and wildlife conservation purposes. It is anticipated this Vulcan-developed technology will ultimately become available for use in the eradication of wildlife poaching, among other applications.

Proposed Operations

Vulcan proposes to conduct commercial operations consisting of aerial data collection. In numerous UAS exemption decisions, the FAA has defined “aerial data collection” broadly to include any remote sensing or measuring by one or more instruments aboard a UAS. Examples include imagery (photography, video, infrared, etc.), electronic measurement (precision surveying, RF analysis, etc.), chemical measurement (particulate measurement, etc.), and any other gathering of data by instruments aboard a UAS. Vulcan concurs in the FAA’s definition of aerial data collection.

Vulcan presently conducts limited noncommercial, developmental UAS activities, exclusively under the auspices of the Lone Star Unmanned Aircraft Systems Center of Excellence and Innovation (LSUASC). These operations are confined to one or more of LSUASC’s designated test sites established in response to the FAA’s 2013 initiative to integrate UAS into the NAS, to which LSUASC responded. As Vulcan’s game management and wildlife conservation project progresses, however, it will be necessary for Vulcan to conduct UAS operations at locations other than LSUASC’s test sites. Since these upcoming Vulcan UAS operations may be considered commercial, this petition for exemption is submitted.

Vulcan proposes to utilize any or all of the following small UAS under this exemption:

- *DJI Phantom 3 Professional*: The Phantom 3 Professional is a quad rotor unmanned aircraft equipped with four propellers each driven by an electric motor powered by a rechargeable battery. The Phantom 3 Professional measures 23.3 inches diagonally and has a weight of two pounds 13 ounces including battery and propellers. Additional information is attached as Exhibit 1 and is available at dji.com. Vulcan has been advised the radio frequency

spectrum used for control of the Phantom 3 Professional complies with Federal Communications Commission (FCC) requirements.

- *Falcon Unmanned Falcon*: The Falcon is a fixed-wing unmanned aircraft equipped with a rechargeable battery-powered electric motor driving a single propeller. The Falcon has a wingspan of eight feet, length of 4.5 feet, and operating weight of up to 11 pounds. Additional information is attached as Exhibit 2 and is available at falconunmanned.com. Vulcan has been advised the radio frequency spectrum used for control of the Falcon complies with FCC requirements.
- *UASUSA Tempest*: The Tempest is a fixed-wing unmanned aircraft equipped with a rechargeable battery-powered electric motor driving a single propeller. The Tempest has a wingspan of 10.5 feet, vehicle weight of 10 pounds and payload capacity of up to 15 pounds. Additional information is attached as Exhibit 3 and is available at uasusa.com. Vulcan has been advised the radio frequency spectrum used for control of the Tempest complies with FCC requirements.
- *UAV Solutions Talon 120LE*: The Talon 120LE is a fixed-wing unmanned aircraft equipped with a rechargeable battery-powered electric motor driving a single propeller. The Talon 120LE has a wingspan of 12.5 feet, length of six feet, and a maximum operating weight of 20 pounds. Additional information is attached as Exhibit 4 and is available at uav-solutions.com. Vulcan has been advised the radio frequency spectrum used for control of the Talon 120LE complies with FCC requirements.

All of these UAS have operating weights far below 55 pounds including payload, and the FAA has previously issued exemptions to operators of at least two of these and hundreds of other types of UAS similar in size, weight, speed and operational capability. See, e.g., Exemption No. 12646, August 28, 2015, covering 324 types of UAS.

Additionally, the FAA has found in the context of small UAS that 1) in accordance with statutory criteria provided in section 333 of Public Law 112-95 in reference to 49 USC § 44704, and 2) in consideration of the size, weight, speed, and limited operating area associated with these aircraft and their operation, a wide variety of UAS meet the conditions of section 333. The FAA has therefore consistently concluded that relief from 14 CFR Part 21, *Certification*

procedures for products and parts, Subpart H—Airworthiness Certificates, is unnecessary in this context, as is relief from any associated noise certification and testing requirements of Part 36.

Vulcan will conduct its UAS operations in accordance with the policies and procedures currently utilized at LSUASC test sites, as amended and supplemented by Vulcan’s internal UAS operations manual currently being developed.¹ The operations manual will require Vulcan’s UAS pilots-in-command (PICs) to hold either an airline transport, commercial, private, recreational, or sport pilot certificate and to meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her certificate. PICs will also be required to 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, or other territory or possession of the United States. Additionally, Vulcan anticipates the operations manual will require that all pilots complete a UAS education and training program (for small UAS) including applicable FAA regulations, the conditions and limitations of the UAS exemption issued to Vulcan, and comprehensive instruction on the content of the manual itself. Training also will include, as appropriate, review of applicable FAA guidance documents including aeronautical background information such as charts, NOTAMS, and Advisory Circulars, as well as radio communications procedures, human factors, small UAS aerodynamics, and weather.

The operations manual will require PICs to conduct a thorough pre-flight inspection to ensure the UAS is in a condition for safe flight. Vulcan will use experienced personnel or technicians to perform maintenance, alterations, and preventive maintenance on the UAS using the methods, techniques, and practices prescribed in the respective manufacturer’s manuals. Vulcan will document and retain all maintenance records for its UAS.

¹ The current policies and procedures utilized include mission planning, mission and technical risk assessments, flight readiness review checklists, standard operating procedures, and briefing forms, among others. Vulcan considers the specific contents of policy and procedure documents as well as Vulcan’s internal UAS operations manual to be proprietary. Copies will be made available to the FAA for its internal use upon request.

The operations manual will restrict the maximum operating speed of Vulcan's UAS to the lesser of the maximum recommended by the manufacturer or 87 knots (100 miles per hour). Similarly, it will restrict altitude to 400 feet above ground level, subject whenever required to Vulcan's receipt of a certificate of waiver or authorization. Minimum flight visibility and distance from clouds for Vulcan's intended operations will be set at three statute miles and 500 feet below/2,000 feet horizontally, respectively.

The areas of intended operations may be within 500 feet of unoccupied vessels, vehicles or structures when the owner or party in control thereof grants permission for such operations. Prior to conducting any such operation, the PIC will make a safety assessment of the risk posed by such operations in order to determine whether they present an undue hazard to persons or property; in the event of an adverse determination by the PIC, the operations will not be conducted. Vulcan anticipates operating UAS in the proximity of airports when necessary, but will do so only to the extent approval has been received from the airport operator. The Vulcan operations manual will also specify that PICs operate the UAS within visual line-of-sight at all times, and that visual observers will supplement the PIC's visual monitoring of the UAS.

Equivalent Level of Safety

Vulcan submits that the requested relief is merited since it will have no adverse effect on safety, and, indeed, will maintain a level of safety at least equivalent to that of operations under the current regulatory structure applicable to conventional manned aircraft. The four small UAS described above each weigh no more than 25 pounds including payload. In addition, these UAS have numerous safety features, such as built-in capability to limit the height of operations above the ground, restrict the UAS's distance from the operator, and exclude the UAS from operating in Class B, C, or D airspace. The UAS also have a failsafe autopilot function, meaning if the aircraft loses communications or loses its GPS signal, it will return to a predetermined location.

Vulcan will operate all UAS flights under the requested exemption over private or controlled-access property, and will do so only with the property owner's/controller's prior consent and knowledge. Also, Vulcan will require that only persons who have consented or otherwise have agreed, will be in the area where aerial data collection will take place. Vulcan is familiar with and understands the proper roles of an observer, communication procedures, proper visual scan techniques, operations at non-towered airports, and appropriate sections of the FAA Aeronautical Information Manual.

Vulcan proposes to conduct its commercial UAS operations in accordance with the 32 FAA-prescribed conditions and limitations typically applicable to similar UAS operations, which are set forth in the attached Exhibit 5. FAA has found consistently that these limitations provide for a level of safety at least equivalent to that of operations under the current regulatory structure applicable to conventional manned aircraft.

Given the small size of the UAS involved here and the conditions and limitations that will govern their use, maintenance, and operation, Vulcan submits that grant of this exemption will achieve at least an equivalent level of safety and will meet the requirements and goals set forth by Congress for commercial UAS operations under section 333 of Public Law 112-95. These same factors demonstrate that Vulcan's UAS operations will present no national security issues. Additionally, Vulcan will comply with all aircraft registration requirements applicable to its UAS.

Public Interest

Small UAS provide a low environmental impact and a highly efficient means of performing aerial data collection. The four UAS described above utilize battery power and electric motors, producing no air pollution and very little noise, and consuming no fossil fuels. These UAS comprise a safe and economical alternative to the fixed- and rotary-wing manned aircraft traditionally utilized for aerial data collection. By helping reduce the number of manned aircraft operating in the NAS, grant of this exemption will help reduce noise and air

pollution, congestion at and around airports, and air traffic control saturation. In short, use of UAS for aerial data collection enhances safety while reducing risk.

Vulcan anticipates that its primary use of UAS will be for aerial data collection in support of game management and wildlife conservation efforts. This will involve the use of high-resolution cameras and lenses connected to a computing board utilizing Vulcan-developed software. This proprietary software is being developed and refined by Vulcan experts to meet the unique challenges and requirements of the mission described in this petition. Vulcan intends for this technology to ultimately become available for use in efforts to eradicate wildlife poaching, among other applications.

Availability of this innovative technology will significantly enhance game management and wildlife conservation while contributing significantly to enforcement efforts against unlawful wildlife poaching – all of which is beneficial to the public. The four UAS mentioned above, all powered by batteries, are far smaller, lighter, quieter, and more maneuverable than manned aircraft burning combustible fuel. The light weight and minimal payload of these UAS allows for high quality aerial data collection without the risks to pilots, camera crew, and persons on the ground associated with a fixed- or rotary-wing manned aircraft. And, UAS – given their ability to operate quietly – will be an especially effective tool in enforcement against wildlife poaching.

Vulcan's proposed operations do not implicate privacy issues. All UAS operations under the requested exemption will be conducted in compliance with Vulcan's operating manual, the UAS manufacturer's manual, the exemption conditions and limitations, and other applicable restrictions. Vulcan will operate its UAS only on property with the approval of the owner or person in control of the property, only near airports pursuant to a letter of agreement with the airport's management or a Certificate of Waiver or Authorization issued to Vulcan, and only in accordance with the restrictions noted above and applicable FARs.

The public benefits discussed above, including the enhanced safety, reduced noise and air pollution, and increased efficiency associated with Vulcan’s use of UAS technology, as well as improvements in wildlife conservation, serve to confirm that grant of the requested exemption would be in the public interest. Vulcan requests that FAA issue the requested exemption as soon as possible.

Conditions and Limitations

Vulcan acknowledges and accepts the conditions and limitations set forth in Exhibit 5, i.e., the 32 conditions and limitations FAA currently applies to commercial UAS operations.

Request for Immediate Issuance Without Comment Period

Vulcan requests that the FAA forgo publishing a summary of this petition in the Federal Register. The FAA has granted numerous exemptions authorizing the use of UAS for aerial data collection, and Vulcan’s petition breaks no new ground. Accordingly, good cause exists to dispense with publication of a summary of this petition in the Federal Register.²

Respectfully submitted,



Aaron A. Goerlich

Jason E. Maddux

GAROFALO GOERLICH HAINBACH PC

Counsel for Vulcan Inc.

² While there is no need to publish a summary of this petition, Vulcan nevertheless provides the following summary in accordance with FAR 11.81(f): Vulcan Inc. petitions the FAA for exemption from various requirements of Parts 61 and 91 of the Federal Aviation Regulations to the extent necessary for the petitioner to conduct commercial operations consisting of aerial data collection utilizing small unmanned aerial systems (UAS).

Exhibit 1

[PHANTOM](#)[INSPIRE](#)[OSMO](#)[RONIN](#)[INDUSTRIAL](#)[PRO SYSTEMS](#)[DEVELOPERS](#)[SUPPORT](#)[Q ENGLISH](#)[STORE](#)[LOGIN](#) | [REGISTER](#)

PHANTOM 3

PROFESSIONAL



AIRCRAFT

Easy to fly
GPS-assisted hover
Automatic flight logs
Vision positioning system

CAMERA

4K video camera
12 megapixel photos
3-axis stabilization gimbal

REMOTE

Easy, intuitive controls
Integrated DJI Lightbridge
Customized Commands

GO APP

Live HD view
Easy video editor
Worry-free autopilot
Built-in flight simulator for practice

PHANTOM 3 PROFESSIONAL SPECS

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AIRCRAFT

Weight (including battery and propellers)	1280 g
Diagonal size (including propellers)	590 mm
Max Ascent Speed	5 m/s
Max Descent Speed	3 m/s
Hover Accuracy	<ul style="list-style-type: none"> Vertical: +/- 0.1 m (when Vision Positioning is active) or +/- 0.5 m Horizontal: +/- 1.5 m
Max Speed	16 m/s (ATTI mode, no wind)
Max Service Ceiling Above Sea Level	6000 m (Default altitude limit: 120 m above takeoff point)
Operating Temperature	0°C to 40°C
GPS Mode	GPS/GLONASS

GIMBAL

Controllable Range	Pitch -90° to +30°
Stabilization	3-axis (pitch, roll, yaw)

REMOTE CONTROLLER

PHANTOM 3 PROFESSIONAL

[AIRCRAFT](#)
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[REMOTE](#)
[GO APP](#)
[SPECS](#)
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Video Output Port	Up to 3.5 km or 2.1 miles (unobstructed, free of interference) when CE compliant USB
Operating Temperature	0°C-40°C
Battery	6000 mAh LiPo 2S
Mobile Device Holder	For tablet or phone
Receiver Sensitivity (1%PER)	-101 dBm ±2 dBm
Transmitter Power (EIRP)	<ul style="list-style-type: none"> FCC: 20 dBm CE: 16 dBm
Working Voltage	1.2 A@7.4 V

INTELLIGENT FLIGHT BATTERY

Capacity	4480 mAh
Voltage	15.2 V
Battery Type	LiPo 4S
Energy	68 Wh
Net Weight	365 g
Max Flight Time	Approximately 23 minutes
Operating Temperature	-10°C to 40°C
Max Charging Power	100 W

CAMERA

Sensor	Sony EXMOR 1/2.3" Effective pixels: 12.4 M (total pixels: 12.76 M)
Lens	FOV 94° 20 mm (35 mm format equivalent) f/2.8, focus at ∞
ISO Range	100-3200 (video) 100-1600 (photo)
Shutter Speed	8s - 1/8000s
Image Max Size	4000 x 3000
Still Photography Modes	<ul style="list-style-type: none"> Single Shot Burst Shooting: 3/5/7 shots Auto Exposure Bracketing (AEB): 3/5 Bracketed Frames at 0.7EV Bias Time-lapse
Video Recording Modes	Phantom 3 Professional <ul style="list-style-type: none"> UHD: 4096x2160p 24/25, 3840x2160p 24/25/30 FHD: 1920x1080p 24/25/30/48/50/60 HD: 1280x720p 24/25/30/48/50/60
Supported SD Card Types	Micro SD Max capacity: 64 GB. Class 10 or UHS-1 rating required
Max Bitrate of Video Storage	Phantom 3 Professional 60 Mbps
Supported File Formats	<ul style="list-style-type: none"> FAT32/exFAT Photo: JPEG, DNG Video: MP4, MOV (MPEG-4 AVC/H.264)
Operating Temperature	0°C to 40°C

VISION POSITIONING

Max Velocity	Less than 8 m/s (when 2 m above ground)
Altitude Range	50 cm-300 cm
Operating Range	50 cm-300 cm
Operating Environment	Surface with clear pattern and adequate lighting (Lux > 15)

BATTERY CHARGER

Voltage	17.4 V
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APP / LIVE VIEW

[Mobile App](#)

DJI GO

[EIRP](#)

100mW

[Power Spectral Density](#)

6.9mW/MHz

[Live View Working Frequency](#)

2.4GHz ISM

[Live View Quality](#)

720P @ 30fps (depending on conditions and mobile device)

[Latency](#)

220ms (depending on conditions and mobile device)

[Required Operating Systems](#)

- iOS 8.0 or later
- Android 4.1.2 or later

[Recommended Devices](#)

- iOS: iPhone 5s, iPhone 6, iPhone 6 Plus, iPad Air, iPad Air Wi-Fi + Cellular, iPad mini 2, iPad mini 2 Wi-Fi + Cellular, iPad Air 2, iPad Air 2 Wi-Fi + Cellular, iPad mini 3, and iPad mini 3 Wi-Fi + Cellular. This app is optimized for iPhone 5s, iPhone 6, and iPhone 6 Plus.
- Android: Samsung tabs 705c, Samsung S6, Samsung S5, Samsung NOTE4, Samsung NOTE3, Google Nexus 9, Google Nexus 7 II, Ascend Mate7, Huawei P8 Max, Nubia Z7 mini, Sony Xperia Z3, MI 3, MI PAD, Smartisan T1.

*Support for additional Android devices available as testing and development continues.

PHANTOM 3 PROFESSIONAL VIDEOS

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VIDEO TUTORIALS

SHOWCASE

Exhibit 2

FALCON SPECIFICATIONS	
Payloads	Combined DAY/IR Video Gimbal (640x480 resolution) NEX 7 24.3MP w/ Forward-Downlook Video 16.1 MP Multispectral (NDVI) w/ Forward-Downlook Video Custom Payloads
Communications	Secure Digital Datalink (128 bit AES encryption optional)
Control Modes	GPS Navigation / Game Mode (No RC/pilot skills required)
Launch Method	Bungee Launch
Recovery Method	Parachute or Belly Landing
Endurance	60+ min, 90 min maximum (operations/mission dependent)
Assembly	Less than 2 min
Ready to Launch	Less than 10 min
Take Off Weight	Up to 11 lb (Payload Dependent)
Payload Weight	Up to 2lbs
Range	3+ miles (terrain / antenna dependent)
Dash Speed	45 knots
Cruise Speed	27 knots
Operating Altitude	Up to 1500 ft
Service Ceiling	Tested to 12,000 ft
Wing Span	8 ft
Length	4.5 ft

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UASUSA

Tempest Platform

- The TEMPEST Platform was designed, developed and fabricated by UASUSA for the University of Colorado, has 5 years of service and 60+ Certificate of Authorizations.
- Up to 25 lbs. payload capacity, your choice of sensors.
- Vehicle weight, 10 lbs.
- Payload capacity, 10-15 lbs.
- Wing span 127.0 inches.
- Endurance, 2 – 4 hours.
- Cruise speed, 50 mph. Max speed, 110 mph.
- Max wind capacity, 60 mph.
- Available in any configuration from basic airframe to mission ready system. This includes autopilot, actuators, motor, speed controller, battery, and catapult launch system.
- Rapid mission deployment and fully portable.
- Has operated at an altitude of 15,000 ft.
- Efficient electric platform with fully rechargeable power system.
- Full design capability and flight consultation available.



UASUSA.COM
229 Airport Road, East Hangar
Longmont, CO 80503

UAV SOLUTIONS

A Solution For Every MissionSM



 **Talon120LE™**

 **Talon240™**

 **Talon120™**

 **Talon240G™**



Talon Series

Fixed Wing Unmanned Aircraft Systems



Talon Series

Fixed Wing Unmanned Aircraft Systems



Rugged, Lightweight Systems for Longer Endurance

The UAV Solutions, Inc. (UAVS) line of fixed wing UAS, developed for military and commercial use, is built from 7075 aircraft grade aluminum and composite materials. Our systems are designed for ease of use to accomplish long endurance missions. The UAVS-developed Dragon View combined electro-optic/infrared imager with pan and tilt stabilized gimbal was designed for these and other UAS. Our systems also have the capability to carry different ISR or multi-spectral sensors. We have adopted an open architecture philosophy for software and hardware components that provides customers with flexibility for future product enhancement. UAVS designs and builds ground control systems for command and control of unmanned vehicles. These solutions range from a Portable Tactical Ground Control System (GCS) with three screens for mission planning and video viewing – ideal for larger aircraft and larger crews - to the Tactical GCS with two screens to a lower cost solution that is a communications radio which can be attached to an IP-based tough book or lap top. A common GCS can be used for UAVS fixed wing and multi rotor platforms.

Features:

- Fully autonomous systems with multiple user modes
- Open architecture systems
- Comprehensive Operations and Maintenance Manuals including maintenance schedule and troubleshooting guide

	 Talon 120LE	 Talon 120	 Talon 240	 Talon 240-G
Wingspan	12.5'	12.5'	20'	20'
Length	6'	6'	9'	9'
MGTOW	16 lbs.	29 lbs.	136 lbs.	160 lbs.
Payload Capacity	2.5 lbs.	2.5 lbs.	12 lbs.	25 lbs.
Launch and Recovery	Hand Launch, belly recovery emergency recovery chute	Bungee or catapult launch, belly recovery	Truck or catapult launch, belly recovery	Truck or catapult launch, belly recovery; or fixed gear option
Range	8 miles LOS		8-20 miles LOS	
Endurance	2.0-2.5 hours	1.5-2.0 hours	2.5-3.5 hours	6-8 hours
Typical Operating Altitudes	50-500 ft. AGL; MSL: 10,000 ft.		50-5000 ft. AGL; MSL: 10,000 ft.	50-5000 ft. AGL; MSL: 12,000 ft.
Propulsion	Electric			AvGas
Inagers (COTS Configuration)	UAVS Dragon View Combined EO/IR Camera Gimbal 336x256 or 640x512 uncooled or other			
Communications (COTS Configuration)	900 MHz Command and Control; 2.4 GHz Digital Data Link Video		300/900 MHz Command and Control; 2.4 GHz Digital Data Link Video	
Color	COTS Configuration is Federal Standard 595C Gray #26373; can be customized to your specifications			

Tactical GCS



Portable GCS



www.uavsolutions.com

UAV SOLUTIONS

Exhibit 5

1. Operations authorized by this grant of exemption are limited to the DJI Phantom 3 Professional, Falcon Unmanned Falcon, UASUSA Tempest, and UAV Solutions Talon 120LE 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 UAS 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 UAS be operated at airspeeds greater than the maximum UAS operating airspeed recommended by the aircraft manufacturer.
4. The UAS 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 UAS 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 UAS 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 UAS 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 Certificate of Waiver or Authorization (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 UAS 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. For tethered UAS operations, the tether line must have colored pennants or streamers attached at not more than 50 foot intervals beginning at 150 feet above the surface of the earth and visible from at least one mile. This requirement for pennants or streamers is not applicable when operating exclusively below the top of and within 250 feet of any structure, so long as the UA operation does not obscure the lighting of the structure.

19. 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.

20. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.

21. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UAS to conduct the intended operation and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater.

22. Air Traffic Organization (ATO) 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.

23. 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.

24. 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.

25. The UAS must remain clear and give way to all manned aviation operations and activities at all times.

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

27. 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.

28. 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.

29. 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.nts.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.

30. The operator must have a motion picture and television operations manual (MPTOM) for all closed-set operations as documented in this grant of exemption.

31. 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.

32. 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.