

UNITED STATES OF AMERICA  
DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION  
WASHINGTON, DC

Reg. Docket No. \_\_\_\_\_

In the Matter of Petition for Exemption of:

Asymmetric Technologies, LLC

For an Exemption from the requirements of the  
Code of Federal Regulations Sections  
Concerning operation of an Unmanned Aircraft System

Pursuant to Section 333 of the  
FAA Modernization and Reform Act of 2012

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Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (“Reform Act”)<sup>1</sup> and 14 C.F.R. 11, Asymmetric Technologies, LLC (“Petitioner”) hereby applies for an exemption from Federal Aviation Regulations (“FARs”) identified below, to allow commercial operation of small unmanned aerial vehicles (i.e. small unmanned aircraft systems or “sUAS”).

This exemption is in accordance with protocols outlined in this petition for exemption, the enclosed Asymmetric Technologies UAS Operations Manual (“Manual”)<sup>2</sup>, the UAS manufacturers operations and maintenance manual (“Aircraft Operations Manual”), and any other requirements established by the FAA pursuant to Section 333 of the Reform Act.

## **I. PETITIONER’S DESCRIPTION**

Petitioner is a Service Disabled Veteran Owned Small Business based in Columbus, OH that has provided various operational and sustainment services to the Federal Government and civilian customers for three years. Additionally, the Petitioner is staffed with personnel who operated and maintained sUAS in Afghanistan and Iraq during Operation Enduring Freedom and Iraqi Freedom.

Petitioner is teamed with Burgess & Niple, Inc. (“B&N”). B&N is a design, construction and inspection firm with over 100 years’ experience in the industry. B&N is a nationally recognized leader in bridge inspection and since 1969 have inspected more than 10,000 bridges in the U.S. and abroad, including bridges with main spans exceeding 500 feet.

The Petitioner’s sUAS operational and maintenance expertise is a natural transition to the infrastructure inspection market and the Petitioner’s partnership with a nationally recognized infrastructure inspection firm drastically reduces overall risk to the public while conducting infrastructure inspection operations.

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<sup>1</sup> Codified at 49 U.S.C. § 40101, as amended by Pub. L. 112-95 Feb. 14, 2012, 126 Stat. 11.

<sup>2</sup> Petitioner submits this manual as a confidential document under 14 C.F.R. § 11.35(b), as the entire Manual contains confidential commercial and proprietary information the Petitioner has not and will not share with others. The Manual contains operating conditions and procedures that are not available to the public and are protected from release under the Freedom of Information Act 5 U.S.C. § 552.

Consistent with the requirements of 14 C.F.R. § 11.81(a), Petitioner provides the following information in support of its petition of exemption:

The name and address of the Petitioner's representative is:

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## **II. PROPOSED OPERATIONS**

The Petitioner proposes to conduct sUAS flight operations in support of a bridge inspection near US Highway 93 in Mohave County, AZ. The Burro Creek bridge sits above Raster Wash adjacent to the Burro Creek Wilderness Area (under control of the Bureau of Land Management), approximately 70 miles south east of Kingman, AZ. The bridge is comprised of twin 960 feet long steel arches that rise 370 feet above a canyon providing excellent access from multiple ground locations to conduct flight operations. There is no roadway below the bridge and the river below the bridge is not navigable by watercraft.



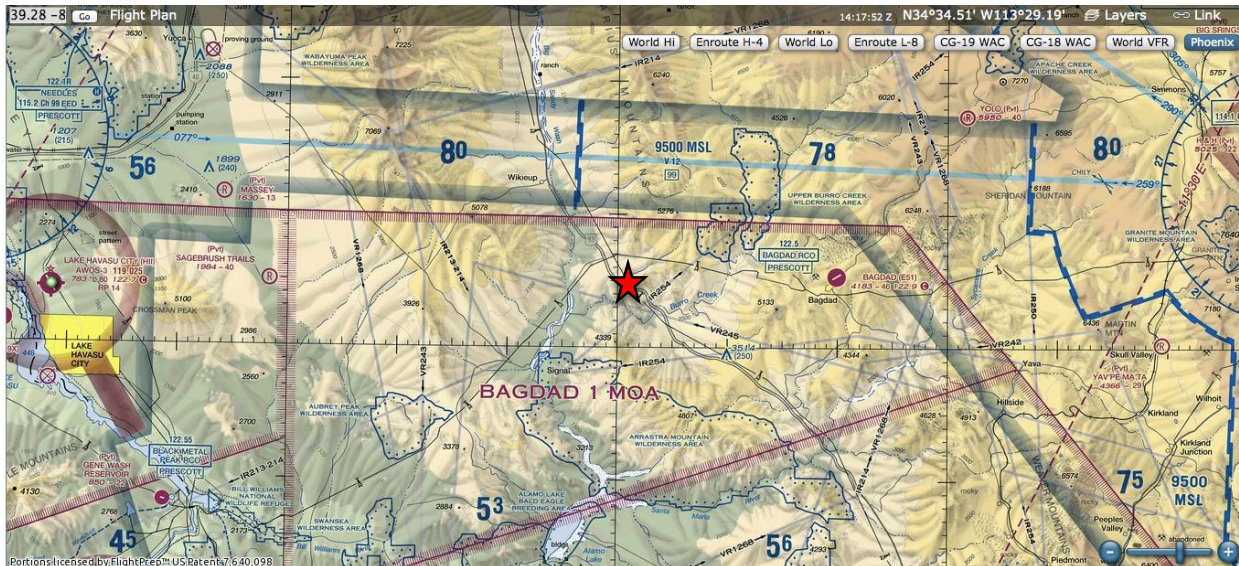
View of Hwy 93 Burro Creek Bridge facing North



View of Hwy 93 Burro Creek Bridge facing East

The closest airport to the Burro Creek Bridge is the Bagdad Airport.<sup>3</sup> The bridge also falls under the MOA BAGDAD 1 special use airspace(7,000 ft. - 17,999 ft. AMSL) area, but since operations are planned under 400 feet, this should pose low risk to any aircraft using the MOA.

View of Bagdad MOA



Prior to conducting an inspection with the sUAS, the Petitioner will conduct a visual inspection utilizing traditional climbing and inspection techniques. Armed with this information, the Petitioner can then conduct a proof of concept - collecting data and information via sUAS to improve the inspection process and test new methods and techniques.

Enclosed in this waiver is the Petitioner's sUAS Manual (Exhibit "A"). The enclosed Manual describes, in detail, the policies and procedures for Petitioner's proposed sUAS operations. To assist the FAA in its safety assessment of the Petitioner's proposed sUAS operations, below is a summary of the operational limitations and conditions which will ensure an equivalent or higher level of safety to operations conducted under current regulatory guidelines:

1. The sUAS weighs less than 15 pounds including payload.
2. Flights will be operated within line-of-sight of a pilot and/or observer during daylight hours only.

<sup>3</sup> FAA LID E51.

3. Maximum total flight time for each operational flight will be 45 minutes. Flights will be terminated at 25% battery power reserve should that occur prior to the 45 minute limit.
4. Flights will be operated at an altitude of no more than 400 feet above ground level.
5. Minimum crew for each operation will consist of the sUAS Pilot, observer/spotter and inspection team leader directing the inspection.
6. The sUAS pilot will be an FAA licensed airman with a private and/or commercial pilot's certificate with rotorcraft experience and a class III physical.
7. The sUAS pilot will be Pilot in Command (PIC). If a pilot certificate holder other than the sUAS Pilot is present and possesses the necessary PIC qualifications, that person can also be designated as PIC.
8. The UAS will only operate within a confined "Sterile Area" as defined in the manual.
9. A briefing will be conducted in regard to the planned sUAS operations prior to each day's activities. It will be mandatory that all personnel who will be performing duties within the boundaries of the safety perimeter be present for this briefing.
10. Pilot and Observer will have been trained in operation of UAS generally and will have received up-to-date information on the particular UAS to be operated, as required in the Manual.
11. Observer and Pilot will at all times be able to communicate by voice and text.
12. Observer and Pilot will have air-to-air radios for communication with low flying air traffic in the area surrounding UAS operations (programmed to 123.025 common Air-to-Air Frequency, and the local frequency for the area of operation).
13. All required permission and permits will be obtained from territorial, state, county or city jurisdictions, including local law enforcement, fire, or other appropriate governmental agencies - including the Bureau of Land Management, Arizona Department of Transportation, and Mohave County.
14. If the sUAS loses communications or loses its GPS signal, the sUAS is equipped with advanced safety features that will allow the sUAS to automatically return to a pre-determined location.
15. The sUAS will have the capability to abort a flight in case of unpredicted obstacles or emergencies.
16. The sUAS will only operate in optimal weather conditions for flight.

### III. RELEVANT AUTHORITY TO PETITIONER’S EXEMPTION REQUEST

This petition for exemption is submitted to advance Congress’ goal of integrating sUAS safely into the NAS. In the Reform Act, Congress directed the FAA “to safely accelerate the integration of civil unmanned aircraft systems in the national airspace system,” and, under Section 333 of that law, directed the Secretary of Transportation (“FAA Administrator”) to consider whether certain unmanned aircraft systems may operate safely in the National Airspace System (“NAS”) before completion of the rule making required under Section 332 of the Reform Act.<sup>4</sup>

In making this determination, the FAA Administrator is required to determine which types of sUAS do not create a hazard to users of the NAS or the public or pose a threat to national security in light of the following:

- The UAS size, weight, speed, and operational capability;
- Operation of the UAS in close proximity to airports and populated areas; and
- Operation of the UAS within visual line-of-sight of the operator.<sup>5</sup>

If the Secretary determines that such vehicles “may operate safely in the National Airspace System, the Secretary **shall establish requirements** for the safe operation of such aircraft in the National Airspace System.”<sup>6</sup>

The FAA Administrator has general authority to grant exemptions from FAA safety regulations and minimum standards when the Administrator decides a requested exemption is in the public interest.<sup>7</sup> A party requesting an exemption must explain the reasons why the exemption: (1) would benefit the public as a whole and; (2) would not adversely affect safety or how it would provide a level of safety at least equal to the existing rules.<sup>8</sup> Therefore, the Petitioner will demonstrate how the proposed sUAS infrastructure inspection will benefit the public and that the proposed operation will not adversely affect safety of the public and to those operating in the NAS.

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<sup>4</sup> Reform Act, *supra* note 1.

<sup>5</sup> *Id.* at § 333(b)(1).

<sup>6</sup> *Id.* § 333(c)(emphasis added).

<sup>7</sup> See 49 U.S.C. § 44701(f) (authorizing the grant of exemptions from a requirement of regulations prescribed pursuant to section 44701 (a) - (b) and sections 44702-44716).

<sup>8</sup> See 14 C.F.R. § 11.81; FAA, Petition for Exemptions.

#### **IV. QUALIFICATION FOR APPROVAL UNDER SECTION 333 OF THE REFORM ACT**

##### **A. The Petitioner's Proposed Usage Does not Create a Hazard to Users of the NAS or the Public Because of the Reduced Size, Weight, Speed, and Operational Capability of the sUAS.**

The proposed operations in this petition for exemption qualify for expedited approval under Section 333 of the Reform Act. Each of the statutory criteria and other potential relevant factors are satisfied.

The proposed operations would permit use of small and relatively inexpensive UAS under controlled conditions in airspace that is: (1) limited; (2) predetermined; (3) controlled as to access, and; (4) would pose an increased level of safety beyond what exists when climbers are asked to inspect infrastructure.

Petitioner's sUAS is a rotorcraft aircraft, weighing less than 15 pounds, including payload. It operates, under normal weather conditions, at a speed of no more than 29 knots and has the capability to hover, and move in vertical and horizontal planes simultaneously.

Petitioner's sUAS will operate in line-of-sight and only in a sterile area described in the Proposed Operations section outline here and in the Petitioner's Manual.<sup>9</sup> Such operations will insure that the sUAS will "not create a hazard to users of the National Airspace System or the public."<sup>10</sup>

Given the small size of the sUAS involved and the restricted sterile environment within which it will operate, this petition for exemption falls squarely within that zone of safety in which Congress envisioned that the FAA must, by exemption, allow commercial operations of UASs to commence immediately.

##### **B. The Petitioner's Proposed Usage Does not Create a Hazard to Users of the NAS or the Public because the Operation of the sUAS will be conducted in a Remote Location not in Close Proximity to Airports and Populated Areas.**

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<sup>9</sup> See Manual Section 6.1.2.1.

<sup>10</sup> Reform Act, *supra* note 1 at § 333 (b)(1).



The Petitioner's proposed usage does not create a hazard to users of the NAS or the public because of the restricted and remote area in which the sUASs will operate. This project is an excellent candidate for the first authorized bridge inspection conducted because of the isolated location of the Burro Creek Bridge.

The Burro Creek Bridge is located in a remote area of Arizona. The bridge sits approximately 130 miles northwest of Phoenix. The closest airport is the Baghdad Airport.<sup>11</sup> Lake Havasu City Airport is located approximately 100 miles to the west of the Burro Creek Bridge. There are no major population centers within 100 miles of the bridge nor are there any large structures in the area surrounding the bridge.

The remote location greatly mitigates the hazard to the public and to the NAS. Because the bridge is so remote, the probability of an accident with the public or with another aircraft in the NAS is virtually eliminated. Thus, the Petitioner's proposed usage of the sUAS does not pose a hazard to the public or to the NAS because of the remote location of the inspection site.

**C. The Petitioner's Proposed Usage Does not Create a Hazard to Users of the NAS or the Public because the Operation of the sUAS will be conducted within visual line-of-sight of the operator.**

The Petitioner has selected the Burro Creek bridge because the bridge's physical characteristics provide excellent lines of sight. First, the bridge support structure is located below the bridge decking. Next, the bridge structure is constructed in a canyon which will provide natural boundaries for the sUAS. Finally, the roadway is 370 feet above the bottom of the canyon so the Petitioner's flight operations will remain below 400 AGL for the duration of the inspection.

**i. The steel arch bridge support structure is constructed below the roadway.**

The initial factor that led Petitioner to propose this bridge for the first inspection is that the structure of the bridge is situated below the bridge decking. In other words, the structure

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<sup>11</sup> FAA LID E51.

supporting the bridge resides below the roadway rather than having bridge supporting structure both above the roadway and below the roadway.

The Petitioner will use the sUAS to visually inspect the support structure of the bridge and the roadway. Because the structure supporting the roadway is below the roadway, in the rare occurrence that a malfunction occurs to the sUAS, the sUAS would fall to the canyon floor rather than onto a roadway. Moreover, the structure of the bridge and the space between the members of the bridge allow the Pilot and observer to maintain line of sight on the sUAS for the duration of the flight. Thus, the risk to the public is greatly reduced because the Pilot will be able to avoid any obstacles and other aircrafts in real time.

**ii. The bridge is situated over a canyon which will provide a natural boundary.**

Petitioner has submitted this location as the initial location because of the geophysical characteristics in the immediate area surrounding the Burro Creek Bridge that creates a natural boundary for the sUAS forcing the pilot to keep the sUAS within line-of-sight. The walls of the canyon will provide terrain that naturally encloses the area surround the structure of the bridge.

The canyon walls will provide a natural barrier that mitigates risk to the public. The natural boundary is an important risk mitigation point because in the event that the sUAS guidance system malfunctions and the sUAS begins to descend, the walls of the canyon will limit the distance that the sUAS will travel before impact while allowing the pilot to maintain line-of-sight. Thus, the sUAS will be operating in highly controlled, very limited airspace reducing the risk to the public because its lateral travel will be confined to the distance between the canyon walls.

**iii. The sUAS will remain below 400 AGL at all times during the operation.**

The Petitioner's sUAS will not fly above 400 AGL at any time during inspection of the Burro Creek Bridge. The Burro Creek Bridge roadway rests 370 above the canyon floor and all supporting structure is situated below the bridge decking.

The Petitioner will launch, operate, and recover the sUAS from the floor of the canyon below the bridge. The inspection method that Petitioner will utilize will not require the sUAS to

pass above 400 feet AGL to successfully complete the inspection. Therefore, the Petitioner's proposed usage will not pose a hazard to the NAS because the sUAS will not operate above 400 AGL at any time during the duration of the flight.

Given the foregoing, the Petitioner's proposed usage does not pose a hazard to the NAS or to the public. Considering the clear statutory language in Section 333 of the Reform Act, the authority contained in the Federal Aviation Act, as amended, the equivalent level of safety to the public and to the men and women conducting infrastructure inspections, and the reduction in environmental effects, the grant of the requested exemptions is in the public interest. Accordingly, Petitioner respectfully requests that the FAA grant the requested exemption without delay.

## **V. REGULATIONS FROM WHICH EXEMPTION IS REQUESTED**

The Federal Aviation Act expressly grants the FAA Administrator the authority to issue exemptions. By its terms, this statutory authority includes exempting civil aircraft, as the term is defined under § 40101 of the Act, including sUASs, from its safety regulations and minimum standards when the Administrator decides a requested exemption is in the public interest.<sup>12</sup>

Petitioner asks an exemption from several interrelated provisions of 14 C.F.R. Parts 21, 45 and 91 for purposes of conducting aerial surveys and inspections using sUAS. Listed below are: (1) the specific sections of 14 C.F.R. for which exemption is sought; and (2) the operating procedures and safeguards that Petitioner has established which will ensure a level of safety equal to or better than the rules from which exemption is sought.<sup>13</sup>

### **A. 14 C.F.R. Part 21, Subpart H - Airworthiness Certificates and 14 C.F.R. § 91.203(a)(1).**

The Petitioner seeks an exemption from 14 C.F.R. Part 21, Subpart H, which establishes the procedural requirements for the issuance of airworthiness certificates as required by 14 C.F.R.

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<sup>12</sup> See 49 U.S.C. § 44701(f) authorizing the grant of exemptions from requirements of regulations prescribed pursuant to §§ 44710(a) and (b), §§ 44702 – 44716.

<sup>13</sup> See 14 C.F.R. § 11.81(e) which requires a petition for exemption to include: “the reasons why granting the exemption would not adversely affect safety, or how the exemption would provide a level of safety at least equal to that provided by the rule from which you seek exemption.”

§ 91.203(a)(1). Given the size and limited operating area associated with the sUAS to be utilized by the Petitioner, an exemption from Part 21, Subpart H meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the Reform Act.

The Federal Aviation Act<sup>14</sup> and Section 333 of the Reform Act<sup>15</sup> both authorize the FAA to exempt aircraft from the requirement for an airworthiness certificate, upon consideration of the size, weight, speed, operational capability, and proximity to airports and populated areas of the particular UAS. In all cases, an analysis of these criteria demonstrates that the sUAS operated without an airworthiness certificate, in the restricted environment and under the conditions proposed will be at least as safe, or safer, than a conventional rotorcraft operating with an airworthiness certificate without the restrictions and conditions of the proposed sUAS operations.

### **Equivalent Level of Safety**

The sUAS to be operated hereunder is less than 15 lbs. fully loaded, carries neither a pilot nor passenger, carries no explosive materials or flammable liquid fuels, and operates exclusively within a secured area as set out in the Manual. Unlike other civil aircraft, the proposed operations in this petition for exemption will be controlled and monitored by the operator, pursuant to the Manual's requirements. Moreover, the FAA will have advance notice of all operations conducted under this exemption.

These safety enhancements, which already apply to civil aircraft operated in connection with existing inspection operations, provide a greater degree of safety to the public and property owners than conventional operations conducted with airworthiness certificates issued under 14 C.F.R. Part 21, Subpart H. Lastly, application of these same criteria demonstrates that there is no credible threat to national security posed by the sUAS, due to its size, speed of operation, location of operation, lack of explosive materials or flammable liquid fuels, and inability to carry a substantial external load.

### **B. 14 C.F.R. Part 27: Airworthiness Standards: Normal Category Rotorcraft.**

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<sup>14</sup> See 49 U.S.C. § 44701(f).

<sup>15</sup> See Reform Act, *supra* note 1.

14 C.F.R. Part 27 sets forth the procedural requirements for airworthiness certification of normal category rotorcraft. To the extent the Petitioner's sUASs would otherwise require certification under Part 27, as a rotorcraft, Petitioner requests an exemption from Part 27's airworthiness standards for the same reasons identified in the exemption request from 14 C.F.R. Part 21, Subpart H.

**C. Aircraft Marking and Identification Requirements: 14 C.F.R. §§ 91.9(c), 45.23(b), and 45.27(a).**

This petition seeks an exemption from the aircraft marking and identification requirements of 14 C.F.R. §§ 91.9(c), 45.23(b), and 45.27(a).

14 C.F.R. § 91.9(c), Civil aircraft flight manual, marking, and placard requirements, provides that:

No person may operate a U.S.-registered civil aircraft unless that aircraft is identified in accordance with part 45 of this chapter.<sup>16</sup>

14 C.F.R. § 45.23(b), Markings of the Aircraft, states:

When marks include only the Roman capital letter "N" and the registration number is displayed on limited, restricted or light-sport category aircraft or experimental or provisionally certificated aircraft, the operator must also display on that aircraft near each entrance to the cabin, cockpit, or pilot station, in letters not less than 2 inches nor more than 6 inches high, the words "limited," "restricted," "light-sport," "experimental," or "provisional," as applicable.<sup>17</sup>

14 C.F.R. § 45.27(a), Rotorcraft, states:

Each operator of a rotorcraft must display on that rotorcraft horizontally on both surfaces of the cabin, fuselage, boom, or tail the marks required by §45.23.<sup>18</sup>

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<sup>16</sup> 14 C.F.R. § 91.9(c).

<sup>17</sup> 14 C.F.R. § 45.23(b).

<sup>18</sup> 14 C.F.R. § 45.27(a).

Exemption from § 45.23(b) is warranted because the sUAS has no entrance to the cabin, cockpit, or pilot station on which the registration number can be placed. Moreover, given the size of the sUAS, two-inch lettering would be impossible. The aircraft registration, or “N Number” will be placed on the fuselage in compliance with § 45.29(f).

Given the nature of the specific relief sought by this exemption request, Petitioner requires relief from the associated marking and identification requirements of § 45.27(a) and § 91.9(c), which would require compliance with § 45.23(b).

### **Equivalent Level of Safety**

An equivalent level of safety for exemptions to the aircraft marking and identification requirements of §§ 91.9(c), 45.23(b), and 45.27(a), will be provided by having the sUAS marked on its fuselage as required by § 45.29(f) where the pilot, observer, and others working with the sUAS will see the identification of the UAS as "Experimental." Additionally, Petitioner will ensure compliance with any requests of sUAS marking by the FAA.

The FAA has issued the following exemptions to the aircraft marking requirements of § 45.23(b): Exemptions Nos. 10700, 8738, 10167 and 10167A.

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

This petition seeks an exemption from the private pilot privileges and limitations of §§ 61.113 (a) and (b), which states:

(a) Except as provided in paragraphs (b) through (h) of this section, no person who holds a private pilot certificate may act as pilot in command of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as pilot in command of an aircraft.

(b) A private pilot may, for compensation or hire, act as pilot in command of an aircraft in connection with any business or employment if:

- (1) The flight is only incidental to that business or employment; and
- (2) The aircraft does not carry passengers or property for compensation or hire.<sup>19</sup>

14 C.F.R. § 61.113(a) limits private pilots to being in command of non-commercial flights. 14 C.F.R. § 61.113(b)(1) provides an exception that allows a private pilot to command an aircraft without passengers or property, in connection with business or employment if "[t]he flight is only incidental to that business or employment."<sup>20</sup> The stated exception likely does not apply to the proposed operations under this petition for exemption, as the flights are not incidental to the proposed aerial surveys and inspections but rather essential to it. Accordingly, the Petitioner seeks an exemption to 14 C.F.R. § 61.113(a)'s commercial limitation and/or 14 C.F.R. § 61.113(b)(1)'s requirement that the flight be incidental to the business to benefit from the exception.

### **Equivalent Level of Safety**

As required by the Manual, Petitioner's sUAS operators acting as PIC will hold a commercial and/or private pilot certification and have rotorcraft experience. Because the sUAS will not carry a pilot or passengers, the proposed operations can achieve the equivalent level of safety to 14 C.F.R. §§ 61.113 (a) and (b).

Unlike a conventional aircraft that carries the pilot and passengers, the sUAS is remotely controlled with no passengers on board. Moreover, the area of operation is controlled and restricted, and all flights are planned, coordinated, and briefed to the appropriate official in advance as set forth in the Manual.

AT can achieve an equivalent level of safety as achieved by current Regulations because the sUASs do not carry any pilots or passengers. Further, while helpful, a pilot license will not ensure remote control piloting skills, though AT's pilot vetting and training programs will ensure the PIC has substantial experience on the airframe. Further, private pilot licensees will operate AT's sUASs with the same skill. The risks attendant to the operation of AT's sUASs are far less

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<sup>19</sup> 14 C.F.R. § 61.113 (a) and (b).

<sup>20</sup> 14 C.F.R. § 61.113(b)(1).

than the risk levels inherent in the commercial activities outlined in 14 C.F.R. § 61, *et seq.* Thus, allowing AT to operate its UASs with a private pilot as the PIC will exceed current safety levels in relation to 14 C.F.R. §§ 61.113 (a) and (b).

**E. 14 C.F.R. § 91.9(B)(2): Civil Aircraft Flight Manual in the Aircraft.**

The Petitioner seeks an exemption from the flight manual requirements of 14 C.F.R. § 91.9(b)(2), which states:

(b) No person may operate a U.S.-registered civil aircraft

(2) For which an Airplane or Rotorcraft Flight Manual is not required by § 21.5 of this chapter, unless there is available in the aircraft a current approved airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof.<sup>21</sup>

Given its size, configuration, and load capacity, the sUAS has no ability to carry such a manual on the aircraft, not only because there is no pilot on board, but because there is simply no room or capacity to carry such an item on the aircraft.

**Equivalent Level of Safety**

The safety related purpose of this manual requirement can be equally satisfied by maintaining the sUAS flight manual at the ground control point where the pilot flying the sUAS will have immediate access to it. Accordingly, Petitioner requests an exemption from § 91.9(b)(2)'s flight manual requirements, on the condition that the sUAS flight manual be available at the control point during each operation.

The FAA has issued the following exemptions to this regulation: Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 9565B, 10167, 10167A, 10602, 32827, and 10700.

**F. 14 C.F.R. § 91.7(a): Civil Aircraft Airworthiness.**

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<sup>21</sup> 14 C.F.R. § 91.9(B)(2).



This petition seeks an exemption from 14 C.F.R. § 91.7(a), which requires that a civil aircraft be in an airworthy condition to be operated. Inasmuch there will be no airworthiness certificate issued for the sUAS, should this exemption be granted, no FAA regulatory standard will exist for determining airworthiness.

### **Equivalent Level of Safety**

The Petitioner's PIC has over 12,000 flight hours and a stellar safety record. Given the size of the sUAS and the requirements contained in the Manual for maintenance and use of safety checklists prior to each flight, an equivalent level of safety will be provided.

The FAA has issued the following exemptions to this regulation: Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 9565B, 10167, 10167A, 10602, 32827, and 10700.

### **G. 14 C.F.R. § 91.103: Preflight Action.**

This petition seeks an exemption from § 91.103, which requires a PIC to become familiar with specific information before each flight, including information contained in the FAA approved Flight Manual on board the aircraft.<sup>22</sup> Inasmuch as an FAA approved flight manual will not be provided for the sUAS, an exemption is requested.

### **Equivalent Level of Safety**

An equivalent level of safety will be provided by following the Aircraft Operations Manual comprehensive preflight checklist. The PIC will take all actions, including reviewing weather, flight battery requirements, landing and takeoff distances, and aircraft performance data, before initiation of flight.

### **H. 14 C.F.R. § 91.109(a): Flight Instruction.**

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<sup>22</sup> 14 C.F.R. § 91.103.

The Petitioner seeks an exemption from 14 C.F.R. § 91.109(a), which provides that “no person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functional dual controls.”<sup>23</sup> sUASs and remotely piloted aircraft, by their design do not have fully functional dual controls. Instead, flight control is accomplished through the use of a control box communicating with the sUAS via radio communications.

### **Equivalent Level of Safety**

Given the size and speed of the sUAS, an equivalent level of safe training can still be performed without dual controls because no pilot or passengers are aboard the sUAS, and all persons will be a safe distance away should the sUAS experience any difficulties during flight instruction.

The FAA has approved exemptions for flight training without fully functional dual controls for a number of aircraft and for flight instruction in experimental aircraft.<sup>24</sup>

### **I. 14 C.F.R. § 91.119: Minimum Safe Altitudes.**

This petition seeks an exemption from the minimum safe altitude requirements of 14 C.F.R. § 91.119. This Section prescribes the minimum safe altitudes under which aircraft may not operate, including 500 feet above the surface and away from any person, vessel, vehicle, or structure in non-congested areas.<sup>25</sup> Section § 91.119(d)(1) allows for a helicopter to operate at less than those minimum altitudes when it can be operated “without hazard to persons or property on the surface,” provided that “each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA.

To provide the intended inspections, the sUAS will normally need to be operated within a range of approximately 50 feet from the infrastructure being inspected. Accordingly, due to the

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<sup>23</sup> 14 C.F.R. § 91.109(a).

<sup>24</sup> See Exemption Nos. 5778K and 9862A.

<sup>25</sup> See 14 C.F.R. § 91.119(c).

nature of the proposed operations, the PIC and the designated observer may at times be less than 500 feet away from structures during the operation, and an exemption is therefore required.

### **Equivalent Level of Safety**

Compared to flight operations with rotorcraft weighting far more than the maximum 15 pounds proposed herein, and the lack of flammable fuel, any risk associated with these operations is far less than those presently presented with conventional aircraft. An equivalent level of safety will be achieved given the size, weight, speed of the UAS as well as the location where it is operated. As set forth in the Manual, the sUAS will be operated in a restricted area, where buildings and people will not be exposed to operations. Because of the advance notice, all affected individuals will be aware of the planned flight operations as set forth in the Manual. Furthermore, by operating at such lower altitudes, the sUAS will not interfere with other aircraft that are subject to the minimum safe altitude regulations.

### **J. 14 C.F.R. § 91.121: Altimeter Settings.**

The Petitioner seeks an exemption from 14 C.F.R. § 91.121, which requires a person operating an aircraft to maintain cruising altitude or flight level by reference to an altimeter that is set to the elevation of the departure airport or barometric pressure.<sup>26</sup> An exemption is required because the sUAS does not have a barometric altimeter, but rather a GPS altitude read out.

### **Equivalent Level of Safety**

An equivalent level of safety will be achieved by following the procedures set forth in the Manual. As prescribed in the Manual, the operator will confirm the altitude of the launch site shown on the GPS altitude indicator before flight. Prior to each flight, the PIC will reset the altimeter to zero and will fly the sUAS below 400 feet AGL. Moreover, the PIC will use the GPS altitude indicator to constantly monitor the sUASs height, thus ensuring operation at safe altitudes.

### **K. 14 C.F.R. § 91.151(a): Fuel Requirements for Flight in VFR Conditions.**

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<sup>26</sup> See 14 C.F.R. § 91.121.

The Petitioner seeks an exemption from 14 C.F.R. § 91.151(a)'s fuel requirements for flight in VFR conditions. Section 91.151(a) states:

(a) No person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed

(1) During the day, to fly after that for at least 30 minutes; or

(2) At night, to fly after that for at least 45 minutes.<sup>27</sup>

The battery powering the sUAS provides approximately 25 minutes of powered flight. An exemption from the 30 minute reserve requirement in 14 CFR § 91.151 is therefore required.

### **Equivalent Level of Safety**

An equivalent level of safety can be achieved by limiting flights to 45 minutes or 25% of battery power, whichever happens first. This restriction would be more than adequate to return the sUAS to its planned landing zone from anywhere within its limited operating area. Operation of the sUAS with less than 30 minutes of reserve fuel does not engender the type of risks that Section 91.151(a) was intended to alleviate given the size and speed of the small UAS. Moreover, operations will be limited to controlled areas where only inspectors or official representatives who have signed waivers will be allowed.

This request for exemption falls within the scope of prior exemptions.<sup>28</sup>

### **L. 14 C.F.R. §§ 91.203(a) and (b): Carrying Civilian Aircraft Certification and Registration.**

This petition seeks an exemption from civil aircraft certification and registration requirements of 14 C.F.R. §§ 91.203 (a) and (b). The regulations provide in pertinent part:

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<sup>27</sup> 14 C.F.R. § 91.151(a).

<sup>28</sup> See e.g. Exemption 10673 (allowing Lockheed Martin Corporation to operate without compliance with § 91.151 (a)); see also FAA Exemptions 2689F, 5745, 10673, and 10808.

(a) Except as provided in § 91.715, no person may operate a civil aircraft unless it has within it the following:

(1) An appropriate and current airworthiness certificate

(b) No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under § 91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.<sup>29</sup>

In addition to the fact that Petitioner is seeking an exemption from the airworthiness certificate requirements, an exemption to this regulation is necessary because: (1) the sUAS's load capacity and size does not allow it to carry certification and registration documents; (2) the sUAS does not have a cabin or cockpit entrance at which the documents could be displayed; and (3) there are no passengers or crew for whom the certificates need be displayed.

### **Equivalent Level of Safety**

To the extent these regulations are applicable to the proposed sUAS operations, an equivalent level of safety will be achieved by keeping these documents at the ground control point where the pilot flying the sUAS will have immediate access to them.

The FAA has issued numerous exemptions to this regulation. A representative sample of other exceptions includes Exemption Nos. 9565, 9665, 9789, 9789A, 9797, 9797A, 9816A, and 10700.

### **M. 14 C.F.R. §§ 91.405(a)(1); 91.407(a)(1); 91.409(a)(1); 91.417(a) and (b): Maintenance Inspections**

The Petitioner seeks an exemption from the maintenance inspection requirements of 14 C.F.R. §§ 91.405(a); 91.407(a)(1); 91.409(a)(2); 91.417 (a) and (b). These regulations specify maintenance and inspection standards in reference to 14 C.F.R. Part 43.<sup>30</sup> An exemption to these

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<sup>29</sup> 14 C.F.R. §§ 91.203 (a) and (b).

<sup>30</sup> *See e.g.* 14 C.F.R. § 91.405(a) (stating that each owner or operator of an aircraft inspected as prescribed in subpart E of this part and shall between required inspections . . . have discrepancies repaired as prescribed in part 43 of this chapter”).

regulations is needed because Part 43 and the stated sections apply only to aircraft with an airworthiness certificate, which the sUAS will not have.

### **Equivalent Level of Safety**

An equivalent level of safety will be achieved because maintenance and inspections will be performed in accordance with the Aircraft Operations Manual.<sup>31</sup> As provided in the Manual, the PIC will ensure that the UAS is in working order prior to initiating flight, oversee and assist in performance of required maintenance, and keep a log of any maintenance performed. The PIC is the person most familiar with the aircraft and best suited to maintain the aircraft in an airworthy condition to provide the equivalent level of safety.

If mechanical issues arise, the sUAS can land immediately and will be operating from no higher than 400 feet AGL. Moreover, the sUAS's small size, carrying capacity, and the fact that flight operations will only take place in restricted areas for limited periods of time, create less risk than the same factors associated with conventional fixed-wing aircraft and rotorcraft performing the same operation.

## **VI. PUBLIC INTEREST**

Consistent with the requirements of 14 C.F.R. § 11.81(d), Petitioner offers the following reasons why granting this petition for exemption is in the public interest, i.e., how granting it would benefit the public as a whole. Approval of exemptions allowing commercial operations of small and lightweight sUAS in the infrastructure inspection industry benefits the public as a whole in several ways.

First, granting the Petitioner's exemption helps fulfill Congress' goal in passing Section 333(a) through (c) of the Reform Act, namely, the FAA Administrator's assessment of whether certain UAS may operate safely in the National Airspace System before completion of the rule making required under Section 332 of the Reform Act.

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<sup>31</sup> See Manual section 4.

Next, the Petitioner's proposed operation significantly improves safety and reduces risk concerning infrastructure inspection by alleviating human exposure to dangers associated with current aerial survey and inspection methods. Manned helicopters performing utility-power generation inspections and patrols have experienced an exceedingly high number of accidents and fatalities.

Other bridge inspection methods include utilizing a mobile inspection platform to lower inspectors over the side of the bridge. To employ this method, inspectors coordinate with the state department of transportation to close a lane of traffic for the length of the bridge. Placing a static vehicle in a lane next to moving traffic is particularly hazardous to motorists and the inspectors alike and has caused serious traffic incidents in the past.

Petitioner's sUASs are battery powered and create no emissions. If Petitioner's sUAS crashes, there is no fuel to ignite and explode. Any impact of Petitioner's lightweight sUASs is far less than a full size helicopter. The public's interest is furthered by minimizing ecological impact of an accident and by reducing human exposure to potentially harmful emissions associated with manned aircraft.

Finally, aerial surveys are valuable tools for utility-power generation inspections. However, problems with safety, cost, statistical integrity, and logistics continue to impede aerial surveys and inspections from conventional manned aircraft. The use of sUAS addresses these problems and is a powerful tool for performing a wide-range of utility-power generation inspection and patrol applications. The public as a whole will benefit from the safer and more cost-effective utility aerial services that sUAS operations provide.

## **VII. PRIVACY**

All flights will occur over Operations to be conducted over public or controlled access property. Additionally, all flight operations will be conducted in a "Sterile Area" as described by the Manual, in which all permissions will be gained by all official personnel and organizations present in the Sterile Area.

Additionally, the U.S. Supreme Court has held that “[a] person traveling in an automobile on public thoroughfares has no reasonable expectation of privacy . . . .”<sup>32</sup> Therefore, Petitioners use of sUAS does not pose a privacy threat to motorists traveling on the roadway inadvertently captured on video because they have no reasonable expectation of privacy. However, to further protect individuals who have had their image captured during an inspection, the Petitioner will sanitize the likenesses of individuals from the final product provided to the customer.

### **VIII. FEDERAL REGISTER SUMMARY**

A. 14 C.F.R. Part 21, Subpart H - Airworthiness Certificates and 14 C.F.R. § 91.203(a)(1).

B. 14 C.F.R. Part 27: Airworthiness Standards: Normal Category Rotorcraft.

C. Aircraft Marking and Identification Requirements: 14 C.F.R. §§ 91.9(c), 45.23(b) and 45.27(a).

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

E. 14 C.F.R. § 91.9(B)(2): Civil Aircraft Flight Manual in the Aircraft.

F. 14 C.F.R. § 91.7(a): Civil Aircraft Airworthiness.

G. 14 C.F.R. § 91.103: Preflight Action.

H. 14 C.F.R. § 91.109(a): Flight Instruction.

I. 14 C.F.R. § 91.119: Minimum Safe Altitudes.

J. 14 C.F.R. § 91.121: Altimeter Settings.

K. 14 C.F.R. § 91.151(a): Fuel Requirements for Flight in VFR Conditions

L. 14 C.F.R. § 91.203(a) and (b): Carrying Civilian Aircraft Certification and Registration.

M. 14 C.F.R. §§ 91.405(a)(1); 91.407(a)(1); 91.409(a)(1); 91.417(a) and (b): Maintenance Inspections

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<sup>32</sup> *U.S. v. Jones*, 132 S.Ct. 945 (2012) quoting *U.S. v. Knotts*, 460 U.S. 276, 281 (1983).



## **IX. CONCLUSION**

The Petitioner moves the FAA Administrator to grant this exemption. Given the foregoing, the Petitioner's proposed usage does not pose a hazard to the NAS or to the public. Considering the clear statutory language in Section 333 of the Reform Act, the authority contained in the Federal Aviation Act, as amended, the equivalent level of safety to the public and to the men and women conducting infrastructure inspections, and the reduction in environmental effects, the grant of the requested exemptions is in the public interest. Accordingly, Petitioner respectfully requests that the FAA grant the requested exemption without delay.

Submitted on October 3, 2014 by:

/s/ Stuart C. Sparker

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