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

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

April 29, 2015

Exemption No. 11446
Regulatory Docket No. FAA−2014−0890

Ms. Dyan Gibbens
President
Trumbull Unmanned, LLC
5340 Weslayan Street #6588
Houston, TX 77005

Dear Ms. Gibbens:

This letter is to inform you that we have granted your request for exemption. It transmits our decision, explains its basis, and gives you the conditions and limitations of the exemption, including the date it ends.

The Basis for Our Decision

By letter dated October 24, 2014[1], you petitioned the Federal Aviation Administration (FAA) on behalf of Trumbull Unmanned, LLC (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial inspections, mapping, monitoring, and security of infrastructure and operations in the energy industry.

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

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

[1] By letter dated February 23, 2015, and posted to the public docket on February 25, 2015, the petitioner responded to the FAA's request for information.

Airworthiness Certification

The UAS proposed by the petitioner are the Lockheed Martin Indago, 3DRobotics Aero-M, 3DRobotics X8, 3DRobtics Flying Squirrel-Specktre, Unmanned Flying Rolling Orb , Sense Fly eBee, SteadiDrone, DJI S1000, and Skywalker Flying Wing X8.[2]

In accordance with the statutory criteria provided in Section 333 of Public Law 112−95 in reference to 49 U.S.C. § 44704, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that the relief from 14 CFR part 21, C*ertification procedures for products and parts, Subpart H—Airworthiness Certificates*, and any associated noise certification and testing requirements of part 36, is not necessary.

The Basis for Our Decision

You have requested to use a UAS for aerial data collection. The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grants of Exemption Nos. 11062 to Astraeus Aerial (*see* Docket No. FAA−2014−0352), 11109 to Clayco, Inc. (*see* Docket No. FAA−2014−0507), 11112 to VDOS Global, LLC (*see* Docket No. FAA−2014−0382), and 11213 to Aeryon Labs, Inc. (*see* Docket No. FAA−2014−0642), the FAA found that the enhanced safety achieved using an unmanned aircraft (UA) with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

Having reviewed your reasons for requesting an exemption, I find that—

- They are similar in all material respects to relief previously requested in Grant of Exemption Nos. 11062, 11109, 11112, and 11213;
- The reasons stated by the FAA for granting Exemption Nos. 11062, 11109, 11112, and 11213 also apply to the situation you present; and
- A grant of exemption is in the public interest.

Our Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701,

[2] The petitioner also proposed to operate the Lockheed-Martin Stalker (Long Endurance) UAS, the Arcturus T-20 UAS, and the OSU Noctua UAS. The FAA is assessing the fuel source and weight of these UAS. When the FAA completes its review, we will proceed accordingly and no further action will be required by the petitioner.

delegated to me by the Administrator, Trumbull Unmanned, LLC is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, Trumbull Unmanned, LLC is hereafter referred to as the operator.

Failure to comply with any of the conditions and limitations of this grant of exemption will be grounds for the immediate suspension or rescission of this exemption.

1. Operations authorized by this grant of exemption are limited to the Lockheed Martin Indago Quadrotor, 3DRobotics Aero-M, 3DRobotics X8, 3DRobtics Flying Squirrel-Specktre,3DRobotics Fixed Wing, 3DRobotics Multirotor, 3DRobotics Quadrotor, , Unmanned Flying Rolling Orb "UFRO", SenseFfly eBee, SteadiDrone, DJI S1000, and Skywalker Flying Wing X8, when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.

2. Operations for the purpose of closed-set motion picture and television filming are not permitted.

3. The UA may not be operated at a speed exceeding 87 knots (100 miles per hour). The exemption holder may use either groundspeed or calibrated airspeed to determine compliance with the 87 knot speed restriction. In no case will the UA be operated at airspeeds greater than the maximum UA operating airspeed recommended by the aircraft manufacturer.

4. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL). Altitude must be reported in feet AGL.

5. The UA must be operated within visual line of sight (VLOS) of the PIC at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license.

6. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the

duration of the flight. The PIC must ensure that the VO can perform the duties required of the VO.

7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The operating documents must be accessible during UAS operations and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents, the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operating documents. The operator may update or revise its operating documents. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator or any law enforcement official upon request. The operator must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption. If the operator determines that any update or revision would affect the basis upon which the FAA granted this exemption, then the operator must petition for an amendment to its grant of exemption. The FAA's UAS Integration Office (AFS-80) may be contacted if questions arise regarding updates or revisions to the operating documents.

8. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics, e.g. replacement of a flight critical component, must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.

9. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.

10. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the UAS is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, e.g. inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.

11. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the aircraft and aircraft components.

12. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.

13. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

14. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. PIC qualification flight hours and currency must be logged in a manner consistent with 14 CFR § 61.51(b). Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building) and determining the PIC's ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption are permitted under the terms of this exemption. However, training operations may only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights, all persons not essential for flight operations are considered nonparticipants, and the PIC must operate the UA with appropriate distance from nonparticipants in accordance with 14 CFR § 91.119.

15. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.

16. The UA may not operate within 5 nautical miles of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD) or for airports not denoted with an ARP, the center of the airport symbol as denoted on the current FAA-published aeronautical chart, unless a letter of agreement with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.

17. The UA may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.

18. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the private or controlled-access property.

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

20. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UA to conduct the

intended operation and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater.

21. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.

22. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification (N-Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.

23. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under 14 CFR §§ 91.9 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.

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

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

26. All Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:
    a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner ensuring the safety of nonparticipating persons; and
    b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

    The PIC, VO, operator trainees or essential persons are not considered nonparticipating persons under this exemption.

27. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.

28. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS-80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

If this exemption permits operations for the purpose of closed-set motion picture and television filming and production, the following additional conditions and limitations apply.

29. The operator must have a motion picture and television operations manual (MPTOM) as documented in this grant of exemption.

30. At least 3 days before aerial filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local Flight Standards District Office (FSDO) with jurisdiction over the area of proposed filming. The 3-day notification may be waived with the concurrence of the FSDO. The plan of activities must include at least the following:
    a. Dates and times for all flights;
    b. Name and phone number of the operator for the UAS aerial filming conducted under this grant of exemption;
    c. Name and phone number of the person responsible for the on-scene operation of the UAS;
    d. Make, model, and serial or N-Number of UAS to be used;
    e. Name and certificate number of UAS PICs involved in the aerial filming;
    f. A statement that the operator has obtained permission from property owners and/or local officials to conduct the filming production event; the list of those who gave permission must be made available to the inspector upon request;
    g. Signature of exemption holder or representative; and
    h. A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which filming will be conducted and the altitudes essential to accomplish the operation.

31. Flight operations may be conducted closer than 500 feet from participating persons consenting to be involved and necessary for the filming production, as specified in the exemption holder's MPTOM.

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

This exemption terminates on April, 30, 2017, unless sooner superseded or rescinded.

Sincerely,

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

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October 24, 2014

Mr. James Williams
Manager, Flight Standards Service
Unmanned Systems Integration Office
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

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

Dear Mr. Williams,

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (FMRA), Trumbull Unmanned, LLC (Trumbull) respectfully requests exemption from multiple regulatory provisions of Title 14 of the Code of Federal Regulation (CFR) and other rules and statutes pertaining to usage of small Unmanned Aircraft Systems (sUAS) operated by Trumbull in support of safe aerial inspections, mapping, and monitoring of infrastructure and operations in the energy industry.

Please note, this version does not contain Appendices B-F referenced in the submission because it contains Trumbull's commercial proprietary information and trade secrets. Trumbull submits these appendices as a Confidential document under 14 CFR 11.35(b). Trumbull has not and will not share that information with others unless under appropriate confidentiality agreements. The content in Appendices B-F is protected from release under the Freedom of Information Act. Sec. 5 U.S.C. 552 *et seq.*

The complete version of Trumbull's request, including all appendices for which Trumbull seeks confidential treatment, has been sent to Marc Bury, Assistant Chief Counsel for International Law, Legislation and Regulations division to allow access within the FAA who need to review all portions of this exemption request for full access to the documents in a controlled manner. We appreciate your efforts; thank you for your time and consideration in this matter.

Respectfully,

Dyan Gibbens

Dyan Gibbens, President
Trumbull Unmanned, LLC

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September 29, 2014

Mr. James Williams
Manager, Flight Standards Service
Unmanned Systems Integration Office
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

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

Re: request for exemption from multiple regulatory provisions of CFR for usage of sUAS operated by Trumbull Unmanned LLC. in support of safe aerial inspections, mapping, and monitoring of infrastructure and operations in the petroleum industry

Dear Mr. Williams,

Trumbull Unmanned LLC. (Trumbull) respectfully requests an exemption from multiple provisions of Title 14 of the Code of Federal Regulations (CFR) to permit the use of small Unmanned Aircraft Systems (sUAS) in support of safe aerial inspections, mapping, monitoring, and security of infrastructure and operations in the energy industry.

This request stems from a strong safety culture and conservative risk-based approach towards UAS operations to reduce hazardous exposure and health, safety, and environment (HSE) risk within the petroleum industry and safety in the energy industry at large. It is important to note that these activities will initially augment and complement current practices and not fully replace manned inspections, monitoring, or security. Safe integration can revolutionize the oil, gas, and power maintenance and repair cycle and enhance regulatory compliance and environmental responsibility.

Accordingly, the grant of an exemption is consistent with the intent of the Congress, as shown in Section 333 of the FAA Modernization and Reform Act of 2012 (Section 333) that safe systems be permitted into the National Airspace System (NAS) prior to the issuance of final regulations governing general use of these systems.

Glossary of Abbreviations

ATC	Air Traffic Control
CFR	Code of Federal Regulations
COA	Certificate of Waiver or Authorization
DoD	Department of Defense
FAA	Federal Aviation Administration
HSE	Health, Safety, and Environment
LOS	Line of Sight
NAS	National Airspace System
Section 333	FAA Modernization and Reform Act of 2012, Section 333
sUAS	small Unmanned Aircraft System
UAS	Unmanned Aircraft System
UAV	Unmanned Aerial Vehicle
UA	Unmanned Aircraft
GCS	Ground Control Station
PIC	Pilot in Command
VLOS	Visual Line of Sight

Background Information – Trumbull Overview

Trumbull integrates sUAS into the energy industry and offers data analytics, engineering, logistics and UAS operational services. Located in Houston, Texas, our operators possess thousands of flight hours, both in manned and unmanned aircraft, with experience in emergency response, combat/combat support, and numerous high-risk operations.

Each employee possesses a decade of experience in both manned and unmanned aviation, ranging from DoD to commercial operations. For years, our team performed UAS operations stateside and abroad. During this time, we researched global UAS best practices in operations, logistics, engineering and operational support. Also, Trumbull collaborates with both national and international UAS test sites as well as universities on developing technologies, shaping regulations, and discovering and sharing best practices.

In addition to UAS operational experience, Trumbull has an agile data science practice. Our team is comprised of manned and unmanned pilots, engineers, and programmers. As a company, we focus on safety and risk management through UAS operations, engineering and logistics.

Trumbull teammates have performed large-scale, enterprise wide aerospace and unmanned integration efforts. To date, Trumbull has performed UAS benefits assessments, risk mitigation and safety protocol development, integration efforts and planning for leaders in the energy sector. We appreciate and thank you for your time and consideration in this matter. Please contact us for questions or concerns.

14 CFR 11.81 (a) – Name and address of the Petitioner

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14 CFR 11.81 (b) – Exemptions Requested:

The FAA considers all aircraft whether manned or unmanned as "aircraft" flown by a "pilot". Title 14 of the Code of Federal Regulations (14 CFR) governs the manner in which all aircraft and pilots operate within the National Airspace System (NAS). Due to the nature of their systems and operation, Unmanned Aircraft Systems (UAS) are unable to comply with certain sections of 14 CFR as the regulations were written prior to the consideration of small UAS operating within the NAS. Trumbull is requesting an exemption from certain parts of 14 CFR cited below in addition to such further exemptions and relief as the FAA may determine is necessary to permit the operations described herein[1].

14 CFR Part 61.113 (a) and (b) – Private pilot privileges and limitations: Pilot in command
14 CFR Part 91.109 – Flight Instruction
14 CFR Part 91.119 (c) – Minimum safe altitudes
14 CFR Part 91.121 – Altimeter settings
14 CFR Part 91.151 (a) – Fuel requirements for flight in VFR conditions
14 CFR Part 91.405 (a) – Maintenance required
14 CFR Part 91.407 (a) (1) – Operation after maintenance, preventive maintenance, rebuilding or alteration
14 CFR Part 91.409 (a)(2) – Inspections
14 CFR Part 91.417 (a) and (b)– Maintenance Records

14 CFR 11.81 (c) – The extent of relief Trumbull seeks, and the reason Trumbull seeks the relief:

14 CFR 61.113 (a) and (b)

§ 61.113 Private pilot privileges and limitations: Pilot in command.
(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

[1] After reviewing exemption No. 11062 and in determining that the UA Trumbull seeks to operate are similar in size, weight, operating conditions, design safety features, and will be operated under specific limitations described herein and in the attached appendices Trumbull is not seeking an exemption from 14 CFR part 21, subpart H.

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.

§ 61.113 (a) and (b) limit private pilots to non-commercial operations, however Trumbull proposes that its sUAS PICs holding at least a third class medical certificate and a private pilot certificate is appropriate. As noted in Exemption No. 11062 the areas of knowledge required of a private pilot to safely operate a sUAS in the manner requested in this document is appropriate. Trumbull requests relief from § 61.113 (a) and (b) to allow a private pilot certificate holder with a third class medical to perform commercial sUAS operations.

14 CFR 91.109

§ 91.109 Flight instruction; Simulated instrument flight and certain flight tests.
(a) No person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls. However, instrument flight instruction may be given in an airplane that is equipped with a single, functioning throwover control wheel that controls the elevator and ailerons, in place of fixed, dual controls, when—

The sUAS that Trumbull intends to operate by design do not have fully functional dual controls. Flight control is accomplished through the use of a ground control station that communicates with the aircraft via radio communications. Although the majority of training is conducted outside of a commercial operating environment, relief is requested for a required supervision flight as outlined Appendix C.

14 CFR 91.119 (c)

§ 91.119 Minimum safe altitudes: General.
Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:
(c) Over other than congested areas. An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

The inspection, surveying, mapping, and emergency response operations that Trumbull intends to support must be accomplished at altitudes below 500 feet AGL thus an exemption from § 91.119 (c) is needed. In accordance with current guidelines, we request operations 400 feet AGL and below.

14 CFR 91.121

> *§ 91.121 Altimeter settings.*
> *(a) Each person operating an aircraft shall maintain the cruising altitude or flight level of that aircraft, as the case may be, by reference to an altimeter that is set, when operating…*

14 C.F.R. § 91.121 requires a person operating an aircraft to maintain cruising altitude or a flight level by reference to an altimeter that is set to the elevation of the departure airport or barometric pressure. Some of the sUAS Trumbull intends to operate are not equipped with a barometric altimeter, but instead use GPS for altitude control, which is transmitted to the pilot via a digitally encoded telemetric data feed. Relief from § 91.121 is requested to allow the GPS, radio, or laser altimeter to be used to maintain the correct AGL altitude.

14 CFR 91.151(a)

> *§ 91.151 Fuel requirements for flight in VFR conditions.*
> *(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.*
> *(b) No person may begin a flight in a rotorcraft 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, to fly after that for at least 20 minutes.*

The operations Trumbull intends to conduct are not point-to-point flights but are limited to a pre-defined area within visual sight of the PIC and will not require an airport for operations. This risk of the aircraft running out of fuel as outlined in § 91.151 (a) does not directly apply to the way in which Trumbull will operate. Further if Trumbull were to maintain a 30-minute reserve, some of its UA its operation would not be possible as the reserve time is greater than the flight time of the UA.

The mapping and inspecting operations Trumbull intends to conduct will be limited to daytime; however our intention of supporting emergency response operations may require night operations thus relief from *§ 91.151 (a)(2)*

14 CFR 91.405 (a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b)

> *§ 91.405 Maintenance required.*
> *Each owner or operator of an aircraft—*

(a) Shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter;

§ 91.407 Operation after maintenance, preventive maintenance, rebuilding, or alteration.
(a) No person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless—
(1) It has been approved for return to service by a person authorized under § 43.7 of this chapter…

§ 91.409 Inspections.
(a) Except as provided in paragraph (c) of this section, no person may operate an aircraft unless, within the preceding 12 calendar months, it has had—
(1) An annual inspection in accordance with part 43 of this chapter and has been approved for return to service by a person authorized by § 43.7 of this chapter; or
(2) An inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter….

§ 91.417 Maintenance records.
(a) Except for work performed in accordance with §§ 91.411 and 91.413, each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:
(1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include…

Trumbull believes that an exemption from these maintenance requirements is warranted because the UA will not have an airworthiness certificate, and the FAA has not developed equivalent part 91 maintenance requirements for sUAS. More specifically, no individuals are authorized by the FAA to approve a sUAS for return to service under 91.407(a) or to conduct initial airworthiness inspections.

14 CFR 11.81 (d) – The reasons why granting Trumbull's request would be in the public interest; that is, how it would benefit the public as a whole:

Granting the exemption will further public interest by allowing Trumbull to safely, efficiently, and economically perform operations to further safe UAS integration into the petroleum industry. An overarching goal of safely integrating sUAS into the petroleum industry is to promote regulatory compliance and environmental responsibility for the public, while, at the same time, enhancing operational efficiencies and cost savings and avoidance for petroleum companies.

With a strong safety and risk culture, and experience in UAS testing, our team will ensure safe sUAS integration. Safe sUAS operations will reduce risk and unnecessary exposure for inspectors and pilots as compared to legacy processes. Risk and change management remain critical components of this sUAS integration.

The use of sUAS will improve incident response and preparedness. Compared to manned aircraft, sUAS typically operate at less than 5% of the fuel usage. Due to lower operating costs, increased inspections will result in proactive maintenance and repair. Safe sUAS operations will enhance situational awareness, and allow for early detection and early action when incidents occur.

The Public will benefit from improved regulatory compliance through aerial inspections and monitoring.

Trumbull will be supporting the energy industry through the development and use of sUAS in the aerial inspection and monitoring of facilities, freestanding structures, and infrastructure. The efficient nature of UA allows for more frequent inspections increasing the likelihood of early detection of any potentially dangerous or harmful structural breaches. Further certain inspections are potentially dangerous operations, unnecessarily placing personnel at risk. UA can perform these inspections, preventing personnel from having to enter potentially hazardous situations. Through benefit analysis, UA are proving safer than legacy inspection processes. UA usage will minimize injuries (and reduce HSE risk to inspectors and lost time injury rates for employees).

The Public will benefit from the enhanced efficiency of the UA.

Many operations Trumbull intends to perform are currently conducted by manned rotorcraft or fixed-wing aircraft. Compared to manned aircraft, UA will generate significantly less air and noise pollution while conducting those same operations. Additionally the efficient nature of UA enable increased inspection frequencies thereby allowing earlier detection of potentially harmful leaks and spills. UA will reduce the carbon footprint for comparable inspections. Further, increased inspections will also enhance regulatory compliance and environmental responsibility.

The Public will benefit from the increased safety of UA.

The scope of work accomplished across the energy industry requires operations in remote areas and in challenging terrain or within hazardous industrial facilities. Successful integration of UA will allow for safer operations in remote or difficult to access areas. They will also increase safety in hazardous facilities where inspections are required. Additionally, UA's ability to support first responders in emergency situations provides a significantly increased level of safety while coordinating response efforts. The potential for increased inspection cycles on infrastructure will further reduce risks to our client's employees and the public-at-large.

The Public will benefit from enhanced situational awareness provided by UA to Emergency Responders.

UA serve as a safe and efficient way to provide an overhead view of emergency situations; allowing Emergency Response efforts to be coordinated more efficiently and further minimize risks to responders and to the public.

14 CFR Part 11.81 (e) – 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 Trumbull seeks the exemption:

14 CFR 61.113 (a) and (b)

Trumbull's sUAS will not be carrying passengers or any other living thing and can be safely operated by a private pilot with a thorough understanding of the NAS and the UA. The additional training and experience acquired through the pursuit of a commercial certificate is critical to a pilot for hire who may encounter numerous situations during a flight and must ensure the safety of its passengers. The extra requirement of a commercial certificate does not meaningfully provide any additional aid or safety to the operations in the confined and restricted manner with which Trumbull intends to operate. As outlined in Appendix C, Trumbull operators undergo initial and periodic written testing and flight evaluation processes in addition to the manufacturer recommended training. The operations Trumbull intends to conduct will keep the sUAS in a defined operating area and at altitudes well below those of conventional aircraft ensuring separation of aircraft at all times.

14 CFR 91.109

The majority of training with sUAS will not be conducted during operations outlined in this petition, however as listed in Appendix C some instruction may be necessary. This training is important to ensure the quality of Trumbull's pilots within the commercial operating environment. Although the Instructor may not have access to dual controls an equivalent level of safety can be achieved by ensuring an instructor is in arms reach of the controls at all times or is able to control the aircraft via alternate equipment. Additionally 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.

14 CFR 91.119 (c)

An equivalent level of safety will be achieved given the size, weight, speed, and operating restrictions and location of the UA. Trumbull will be conducting operations in a clearly defined and restricted operating area usually owned by the client. Operations will only be in and amongst participating personnel who have been briefed on the operations, their potential risks, and have acknowledged and accepted those risks. Additionally Trumbull will strictly adhere to the operating procedures outlined in Appendix B to ensure no operations are

unnecessarily conducted over personnel or property that can be injured or damaged by the UA. By operating at altitudes below 400 feet AGL, UA operations will be separated from those conventional aircraft that must comply with § 91.119. Given that UA operations will be conducted in lieu of manned aircraft that are significantly heavier, using large quantities of flammable fuel, UA are significantly safer to the participants and the public.

14 CFR 91.121

By 'zeroing' the AGL altitude at the launch point in accordance with the procedures outlined by the manufacturers manual an equivalent level of safety can be achieved. In addition to the UA always being within VLOS, the PIC will have a real time display of the systems GPS altitude via a digitally encoded telemetric data feed downlinked from the UA to the GCS. This data will ensure the UA remains below the maximum operating altitude (maximum 400 feet AGL) at all times.

14 CFR 91.151

Given the size of the sUAS and the manner in which they are operated this is as safe or safer than traditional manned operations. Additionally the manner in which the UA will be flown within a confined operating area and flying pre-planned routes that can be completed prior to fuel/battery depletion minimize the risk addressed in *§ 91.151.* In accordance with Appendix B, Trumbull will maintain a 20% fuel or battery reserve for all operations. This reserve will ensure the UA can be safely landed prior to reaching a critical fuel state. Trumbull's UA are also equipped with failsafe mechanisms that automatically return and land the UA when a pre-determined fuel or battery state is reached.

An equivalent level of safety can be maintained for operations at night by confining operations to a defined area and closely adhering to Trumbull's risk and operating procedures outlined in Appendix B under the section titled "Night Operations".

14 CFR 91.405 (a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b)

An equivalent level of safety can be achieved by ensuring all manufacturer published maintenance procedures in additional to Trumbull's internal operational risk mitigation and maintenance processes are accomplished. These processes can be found in Appendix D. Given the size and manner in which the sUAS will be operated, particularly that it will remain below 400 feet AGL and within visual line of sight, it can quickly be landed after any indication of mechanical issues further limiting any risk.

14 CFR Part 11.81 (f) A summary the FAA can publish in the *Federal Register*, stating:

(1) The rule from which you seek the exemption

Petitioner: Trumbull Unmanned, LLC.

Sections of 14 CFR that Trumbull seeks exemption:

14 CFR Part 61.113 (a) and (b) – Private pilot privileges and limitations: Pilot in command
14 CFR Part 91.109 – Flight Instruction
14 CFR Part 91.119 (c) – Minimum safe altitudes
14 CFR Part 91.121 – Altimeter settings
14 CFR Part 91.151 (a) – Fuel requirements for flight in VFR conditions
14 CFR Part 91.405 (a) – Maintenance required
14 CFR Part 91.407 (a) (1) – Operation after maintenance, preventive maintenance, rebuilding or alteration
14 CFR Part 91.409 (a)(2) – Inspections
14 CFR Part 91.417 (a) and (b)– Maintenance Records

(2) A brief description of the nature of the exemption you seek:

Trumbull seeks relief from the applicable parts of 14 CFR 61 and 91 as requested within this petition to allow Trumbull to safely and efficiently conduct commercial UAS flight operations in support of the energy industry and to further research and development for our clients and the unmanned aircraft industry-at-large.

14 CFR Part 11.81 (g) – Any additional information, views or arguments available to support Trumbull's request:

Allowing this exemption will give Trumbull the ability to further promote the development of UAS technologies in a manner that increases safety, security, and efficiency, while providing positive economic impact for our clients and the public. Trumbull maintains strong relationships across the petroleum industry, the unmanned aircraft industry, and the FAA in an effort to conservatively integrate unmanned technologies in a manner that will ensure safe operations that benefit the public at-large. An industry as safety-conscious as the petroleum industry is eager to pursue any opportunity to reduce risk to its personnel and the public. SUAS are an appealing technology that allow companies a way to reduce health, safety, and environment (HSE) exposure of petroleum industry employees, partners and the public. Safe and proper use of sUAS can also support increased regulatory compliance and environmental responsibility. The efficient nature of UA allow for more detailed and frequent monitoring and documentation of wildlife and habitats, reclamation efforts, and air sampling. This increased activity can all be done while reducing environmental impacts of operations.

Trumbull takes any and all First and Fourth Amendment concerns related to the operation of unmanned systems seriously. Trumbull operations will either occur on the clients' private property or in remote locations where all participating individuals will be aware of and have acknowledged any imagery or video being collected. Additional procedures ensuring privacy can be found in Appendix B under the section titled "Data Collection".

14 CFR Part 11.81 (h) – Request to exercise the privileges of the exemption outside the United States, the reason why Trumbull needs to do so:

Given the global nature of our client's operations, Trumbull requests to exercise the privileges of the exemption outside of the United States. The activities of the petroleum industry are global in nature and will benefit from the increased safety, efficiency, security, and economic advantages of utilizing UA. Trumbull maintains a close relationship with the International Consortium of Aeronautical Test Sites and works closely with those countries to accomplish all ICAO and host nation requirements.

If the FAA believes additional exemptions beyond those requested in this petition are required for Trumbull to conduct sUAS operations described here, we respectfully request an exemption from any such regulatory provisions as deemed necessary. For any questions or concerns, please contact me directly at the phone number or email address provided.

Very Respectfully,

Dyan Gibbens

Dyan Gibbens, President
Trumbull Unmanned LLC

Appendix A

Proposed Aerial Vehicles

Lockheed Martin Long Endurance SUAS
Lockheed Martin Indago Quadrotor
3DRobotics Fixed Wing
3DRobotics Multirotor
3DRobotics Quadrotor
Arcturus T-20
Unmanned Flying Rolling Orb "UFRO"
Sensefly eBee
SteadiDrone
DJI S1000
Skywalker Flying Wing X8
OSU Noctua fixed wing quiet UAV