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

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

August 6, 2015

Exemption No. 12372
Regulatory Docket No. FAA–2015–1955

Mr. Gregory Harris
Attorney
Caterpillar Inc.
100 Northeast Adams Street
Peoria, IL 61629

Dear Mr. Harris:

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

By letter dated May 14, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Caterpillar Inc. (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial surveying, videography, cinematography, filmmaking, and inspections.

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

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

Airworthiness Certification

The UAS proposed by the petitioner are the Trimble UX5, DJI Inspire 1, DJI Phantom, DJI Phantom 2, and Parrot Bebop[1].

[1] The petitioner also proposed to operate the Hoverfly Scripta. The FAA must conduct an assessment on this aircraft, which also includes a finding that the proposed UAS meet the conditions in Section 333 of Public Law 112−95. When the FAA completes its review, we will proceed accordingly and no further action will be required by the petitioner.

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

The Basis for Our Decision

You have requested to use a UAS for aerial data collection[2]. The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grants of Exemption Nos. 11062 to Astraeus Aerial (*see* Docket No. FAA−2014−0352), 11109 to Clayco, Inc. (*see* Docket No. FAA−2014−0507), 11112 to VDOS Global, LLC (*see* Docket No. FAA−2014−0382), and 11213 to Aeryon Labs, Inc. (*see* Docket No. FAA−2014−0642), the FAA found that the enhanced safety achieved using an unmanned aircraft (UA) with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

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

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

Our Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701, delegated to me by the Administrator, Caterpillar Inc. is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

[2] Aerial data collection includes any remote sensing and measuring by an instrument(s) aboard the UA. Examples include imagery (photography, video, infrared, etc.), electronic measurement (precision surveying, RF analysis, etc.), chemical measurement (particulate measurement, etc.), or any other gathering of data by instruments aboard the UA.

Conditions and Limitations

In this grant of exemption, Caterpillar Inc. 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 Trimble UX5, DJI Inspire 1, DJI Phantom, DJI Phantom 2, and Parrot Bebop 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 August 31, 2017, unless sooner superseded or rescinded.

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

Enclosures

CATERPILLAR®

VIA FDMS

May 14, 2015

U.S. Department of Transportation
Federal Aviation Administration
Docket Management System
1200 New Jersey Ave, SE
Washington, DC 20590

Re: *Caterpillar Inc. - Petition for Exemption*

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 ("FMRA")[1] and 14 C.F.R. Part 11, Caterpillar Inc. ("Caterpillar") seeks an exemption from the Federal Aviation Regulations ("FARs") listed below to permit commercial operation of small Unmanned Aircraft Systems ("UAS") to perform various tasks including:

- aerial surveying;
- filmmaking, cinematography and videography;
- construction and mine site inspection and monitoring;
- inspection and monitoring of large equipment;
- utility-power generation system inspection; and
- public entity support operations.

The five (5) UAS proposed for use by Caterpillar are the Trimble UX5; DJI Inspire I; DJI Phantom; DJI Phantom 2; Parrot Bebop; and Hoverfly Scripta. Caterpillar's UAS operations will be conducted under the safeguards described in this petition and as may be further established by FAA.[2]

---

[1] Pub. L. No. 112-95, § 333, 126 Stat. 76.

[2] In support of this petition, Caterpillar is submitting confidentially and under separate cover its Caterpillar UAS Operations and Maintenance Manual (the "Manual"), together with the following UAS-specific user guides and manuals: (1) Trimble UX5 User Guide (Attachment 1); (2) DJI Inspire I User Manual (Attachment 2); (3&4) DJI Phantom & Phantom2 User Manuals (Attachments 3&4, respectively); (5) Parrot Bebop User Manual (Attachment 5); and Hoverfly Scripta User Manual (Attachment 6). Caterpillar requests confidential treatment of the Manual under 14 C.F.R. § 11.35(b), as it contains confidential commercial and proprietary information that Caterpillar has not and will not share with others. Such documents are not publicly available and are protected from release under the Freedom of Information Act, 5 U.S.C. § 552 *et seq.*

The agency has already issued over 320 Section 333 exemptions to various commercial enterprises for UAS applications ranging from aerial photography and precision agriculture to construction and surface mining (the "Section 333 Grants").[3] Indeed, FAA has granted at least 34 exemptions to companies specifically for construction, mining and/or utility inspections, and many others for aerial surveying, filmmaking, cinematography and videography more generally.[4] In issuing the Section 333 Grants, FAA found that "the enhanced safety achieved using an unmanned aircraft (UA) with the specifications described by the petitioner . . . gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest."[5] The same public interest and safety justifications apply to Caterpillar's petition, and should enable FAA to grant Caterpillar's petition on an expedited basis.

As described more fully below, the requested exemption would permit Caterpillar to operate the specified UAS under controlled conditions in low-altitude airspace that is: (1) access limited; (2) predetermined; and (3) located a sufficient distance from congested areas and airports, and would provide safety enhancements to operations using conventional aircraft. Caterpillar's UAS are small, weighing 55 lbs. or less fully loaded, and under normal conditions, they will operate at speeds of 50 knots or less, and under no circumstances will they be operated at speeds exceeding 87 knots.

I. Petitioner

Caterpillar is the world's leading manufacturer of construction, mining, and forestry machinery, including diesel and natural gas engines, industrial turbines and diesel-electric locomotives.

Caterpillar now seeks to expand on this success by utilizing UAS in our operations. This new capability will, among other things, allow Caterpillar to supplement or supplant human workers in performing inspections, surveying and monitoring in hazardous mining, blasting and construction areas and also substitute UAS for aerial survey and photography services, which are currently conducted at significant expense with fixed or rotary winged manned aircraft. The UAS we propose to fly in these applications weigh under 55 lbs., and carry no combustible material or people on board. This presents a significant increase in safety to flight crew, the national airspace system ("NAS"), and people on the ground over manned fixed and rotary winged aircraft. Performing these hazardous tasks with UAS will limit human involvement only to those situations where physical work is required. As an industry leader in safety, Caterpillar is committed to any measure that will put fewer lives in danger, and integrating UAS into Caterpillar's operations will do just that.

---

[3] *See* FAA, *Authorizations Granted Via Section 333 Exemptions* (rev. May 12, 2015), https://www.faa.gov/uas/legislative_programs/section_333/333_authorizations/; *see also, e.g.,* Exemption No. 11109 in Docket No. FAA-2014-0507 (Clayco, Inc.); Exemption No. 11286 in Docket No. FAA-2014-0960 (Balfour Beatty Construction Services US); and Exemption No. 11227 in Docket FAA-2014-0678 (EnviroMINE, Inc.).

[4] *See id*.

[5] *See, e.g.,* Exemption No. 11227 at 6.

All communications regarding Caterpillar's petition should be directed to:

Caterpillar Inc.
100 NE Adams Street
Peoria, IL 61629
Attn : Gregory Harris
Ph: 309-494-7622
Email: harris_gregory@cat.com

II. Section 333

Caterpillar's petition is consistent with Congress's goal set forth in Section 333 of the FMRA, which directs the Secretary of Transportation to consider whether certain UAS may operate safely in the NAS before completion of the rulemakings required under Section 332 of that legislation. In making this determination, the Secretary 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 the following: (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 visual line of sight of the operator.[6] To implement Section 333, FAA has the authority to issue exemptions from its safety regulations and minimum standards when the Administrator decides a requested exemption is in the public interest.[7]

Caterpillar's proposed UAS operations meet the requirements of, and qualify for expedited approval under, Section 333. Caterpillar's UAS weigh 55 lbs. or less, will operate at less than 400 feet above ground level (AGL) within visual line of sight (VLOS) at speeds of no more than 50 knots. Operations conducted under these safeguards will provide at least an equivalent level of safety compared to the current regulatory structure. They will also provide an environmental impact benefit over manned aircraft because Caterpillar's UAS will draw their power from rechargeable batteries, as opposed to the hundreds of pounds of fossil fuels burned in the operation of manned aircraft that are thousands of times heavier.

Moreover, Caterpillar's operations will not "create a hazard to users of the national airspace system or the public or pose a threat to national security" due to the small size of the UAS and the restricted areas in which they will operate.[8]

---

[6] FMRA § 333(a).

[7] *See* 49 U.S.C. § 106(f) and 49 U.S.C. § 44701(f).

[8] *See, e.g.,* Exemption No. 11062 in Docket No. FAA-2014-0352 (Astraeus Aerial), at 8 (*citing* FMRA § 333(b)).

III. Regulations from Which an Exemption is Requested

Caterpillar requests an exemption from the following regulations to the extent necessary to conduct the operations described in this petition:

- 14 C.F.R. §§ 61.23(a) and (c)
- 14 C.F.R. §§ 61.101(e)(4) and (5)
- 14 C.F.R. § 61.113(a)
- 14 C.F.R. § 61.315(a)
- 14 C.F.R. § 91.7(a)
- 14 C.F.R. § 91.119(c)
- 14 C.F.R. § 91.121
- 14 C.F.R. § 91.151(a)
- 14 C.F.R. § 91.405(a)
- 14 C.F.R. § 91.407(a)(1)
- 14 C.F.R. §§ 91.409(a)(1) and (2)
- 14 C.F.R. § 91.417(a) and (b)

The following subsections describe Caterpillar's request for an exemption from each of these regulations and demonstrate how Caterpillar's operations will provide for at least an equivalent level of safety compared to the current regulatory structure that applies to manned aircraft.

A. 14 C.F.R. §§ 61.23(a) and (c) – Medical certificates: Requirement and duration

Sections 61.23(a) and (c) generally require pilots of manned aircraft to hold a FAA medical certificate in order to exercise pilot privileges. As of March 24, 2015, however, FAA determined as matter of policy that operators holding a valid driver's license in lieu of a third class medical certificate may conduct commercial UAS operations under a Section 333 grant.[9] Accordingly, Caterpillar requests an exemption from these provisions to the extent necessary to give Caterpillar the same relief from medical certificate requirements that FAA has afforded to over 320 other Section 333 operators via the Section 333 Grants.[10]

B. 14 C.F.R. §§ 61.101(e)(4) and (5) – Recreational pilot privileges and limitations

Sections 61.101(e)(4) and (5) prohibit a recreational pilot from acting as pilot in command of an aircraft for compensation or hire or in furtherance of a business. Since Caterpillar will be conducting its UAS operations in furtherance of its construction, mining and other services, it requests an exemption

[9] *See, e.g.,* Exemption No. 11227 in Docket No. FAA-2014-0678 (EnviroMINE, Inc.), at 4, 8; *see also* FAA, *FAA Summary Grants Speed UAS Exemptions* (Apr. 9, 2015), https://www.faa.gov/news/updates/?newsId=82485.

[10] *See supra* note 3.

from these provisions to the extent necessary. Caterpillar notes that FAA has provided such relief to over 320 other Section 333 operators.[11]

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

Section 61.113(a) limits private pilots to conducting non-commercial operations. FAA has already determined, however, that a private pilot certificate is sufficient to conduct commercial UAS flights; in fact, the agency has revised its Section 333 approval framework to allow UAS operations to be conducted by a pilot with only a recreational or sport pilot certificate.[12]

Consistent with the operating conditions and limitations specified in the Section 333 Grants, Caterpillar will utilize only pilots holding a FAA airline transport, commercial, private, recreational, or sport pilot certificate and at least a valid U.S. driver's license. The UAS will be operated within VLOS of the PIC at all times, and because the area of operation will be controlled and restricted in accordance with the safeguards contained in the Manual and the FAA-approved conditions and limitations described in Section VI, *infra*, permitting the UAS operations as requested would provide for the level of safety otherwise achieved through Section 61.113(a). Accordingly, grant of the requested exemption, subject to the conditions and limitations specified herein, would not adversely affect the safety of the NAS.

D. 14 C.F.R. § 61.315(a) – Sport pilot certificate privileges and limits

Section 61.315(a) authorizes a sport pilot certificate holder to act as pilot in command of a light-sport aircraft, subject to certain restrictions specified in Section 61.315(c), including a prohibition on doing so for compensation or hire or in furtherance of a business, among other restrictions. Since Caterpillar will be conducting its UAS operations in furtherance of its business purposes, it requests an exemption from this provision to the extent necessary. Caterpillar notes that FAA has provide the same relief to over 320 other Section 333 operators.[13]

E. 14 C.F.R. § 91.7(a) – Civil aircraft airworthiness

Section 91.7(a) prohibits any person from operating a civil aircraft unless it is in an airworthy condition. FAA has stated that no exemption is required for 14 C.F.R. § 91.7(a) to the extent that the airworthiness certificate requirements of Part 21[14] are waived or inapplicable. Such airworthiness certificate requirements are inapplicable here, insofar as Caterpillar's UAS provides an equivalent level

---

[11] *See supra* note 3.

[12] *See, e.g.,* Exemption No. 11422 in Docket No. FAA-2015-0154 (Soar Environmental Consulting, Inc.), at 4.

[13] *See supra* note 3.

[14] FAA has concluded that no exemption from Part 21, Subpart H (Airworthiness Certificates) is needed if the agency makes a finding under the FMRA that the UAS selected provides an equivalent level of safety when compared to aircraft normally used for the same application. These criteria are met here, and therefore no exemption is needed. *See, e.g.,* Exemption No. 11062, Docket No. FAA-2014-0352 at 13-14, 22. But to the extent FAA determines that there are some characteristics of Caterpillar's UAS that fail to meet the "equivalent level of safety" requirement of the FMRA, an exemption is requested.

of safety when compared to manned aircraft, consistent with the relevant language of the FMRA and the precedent established by the Section 333 Grants.[15]

F. 14 C.F.R. § 91.119 – Minimum Safe Altitudes

Section 91.119 establishes safe altitudes for operation of civil aircraft.[16] Specifically, Section 91.119(c) provides that except when necessary for takeoff or landing, no person may operate an aircraft below an altitude of 500 feet above the surface except over open water or sparsely populated areas and that in such cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle or structure. As detailed in the Section 333 Grants, however, FAA has determined that adherence to certain safety measures is sufficient to warrant an exemption for UAS operations.[17] Consistent with the relief provided to other UAS operators via the Section 333 Grants, Caterpillar requests an exemption to the extent necessary to operate below an altitude of 500 feet AGL and closer than 500 feet to any person, vessel or structure. An equivalent level of safety will be achieved given the size, weight and speed of Caterpillar's UAS, as well as the locations where it will be operated.

G. 14 C.F.R. § 91.121 – Altimeter Settings

Although Section 91.121 requires each person operating an aircraft to maintain cruising altitude by reference to an altimeter that is set "to the elevation of the departure airport or an appropriate altimeter setting available before departure" and Caterpillar's UAS will not be equipped with a typical barometric altimeter, FAA has already granted relief from this provision to other UAS operators flying at similarly low altitudes.[18] Caterpillar will operate the UAS within VLOS at or below 400 feet AGL and provide altitude information to the PIC via a digitally encoded telemetric data feed that downlinks from the aircraft to a ground-based on-screen display. The altitude information will be generated by equipment installed on the UAS, and prior to each flight a zero altitude initiation point will be established and confirmed for accuracy by the PIC.

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

Section 91.151(a) prohibits an individual from beginning "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." But provided certain operational parameters are established, FAA has found that good cause exists for granting exemptions from this provision for operations in a multitude of contexts.[19]

---

15 *See, e.g., id.*

16 FAA determined in the Section 333 Grants that relief from other provisions of Section 91.119 are either unwarranted or inapplicable. *See* Exemption No. 11062 at 20.

17 *See, e.g., supra* note 3.

18 *See id.*

19 *See supra* note 3.

Caterpillar will be operating a less than 55 pound UAS in tightly controlled environments at speeds below 50 knots and within VLOS. Combined with the fact that Caterpillar will not conduct operations unless the UAS has enough available power to complete the intended mission and return, relief from Section 91.151(a) is warranted, in accordance with the conditions and limitations specified in Section VI, *infra*.

I. 14 C.F.R. §§ 91.405(a); 91.407(a)(1); 91.409(a)(1) and (2); and 91.417(a) and (b): Maintenance Inspections

These FAR provisions require that an aircraft operator or owner "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. . .," and that other persons shall inspect or maintain the aircraft in compliance with Part 43. Through the Section 333 Grants, however, FAA has established safety measures for certain UAS operations sufficient to warrant an exemption from these provisions.[20]

Caterpillar will strictly adhere to the maintenance and inspection requirements set forth in its Manual, which is consistent with applicable conditions and limitations described in Section VI, *infra*. These requirements include the development and documentation of maintenance, overhaul, replacement and inspection requirements; procedures to document and maintain maintenance records with regard to Caterpillar's UAS; and UAS technician qualification criteria.

IV. Characteristics of Caterpillar's UAS

All of the UAS which Caterpillar will operate under this proposed exemption are small, weighing less than 55 lbs. maximum gross weight, and they will operate at 50 knots or less. They all feature automatic return to home or flight termination procedures in the event of a loss of controller signal or diminished battery output or capacity.

V. Unmanned Aircraft PIC

As described above, the PIC will be a FAA licensed airman with either an airline transport, commercial, private, recreational, or sport pilot certificate, that holds a current FAA airman medical certificate or a valid U.S. driver's license. The PIC will also meet the flight review requirements specified in Section 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

VI. Operation of the Unmanned Aircraft

Caterpillar will conduct all flights under the requested exemption subject to the following conditions and limitations, and as further detailed in the Manual:

---

[20] *See id*.

A. The UAS will weigh less than 55 pounds, including payload.

B. The UAS will not be flown at a ground speed exceeding 50 knots.

C. Flights will be operated at an altitude of no more than 400 feet AGL, as indicated by the procedures specified in the Manual. All altitudes reported to ATC will be in feet AGL.

D. The UAS will be operated within VLOS of the PIC and/or VO at all times.

E. When operations utilize a VO, the PIC will always maintain VLOS capability and the VO and PIC will be able to communicate verbally at all times.

F. Prior to each operation, the PIC will inspect the UAS to ensure it is in a condition for safe flight. If the inspection reveals a condition that affects the safe operation of the UAS, it will not be operated until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight. The GCS will also be included in the preflight inspection. All maintenance and alterations will be documented in the UAS records.

G. Caterpillar will follow the manufacturer's UAS aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements.

H. The PIC will possess a current FAA airman medical certificate or a valid U.S. driver's license. The PIC will be trained in accordance with the Manual, and will undergo training to ensure that he or she can follow these procedures.

I. Prior to conducting commercial operations under this exemption the PIC will assess the intended operating area, including weather and any potential obstacles, and determine procedures in case of emergency.

J. The UAS will not be operated within 500 feet of any nonparticipating persons, vessels, vehicles, or structures unless 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.

K. If the UAS loses communications or loses its GPS signal, the PIC will institute emergency procedures in accordance with the Manual.

L. The UAS will not be operated unless it has enough available power to conduct the intended operation and return, or with the reserve power recommended by the manufacturer, whichever is greater.

M. Caterpillar will obtain a Certificate of Waiver or Authorization (COA) prior to conducting any operations above 200 feet AGL under the exemption.[21]

[21] Pursuant to its new "blanket" COA, FAA will automatically grant a COA for flights at or below 200 feet to any UAS operator with a Section 333 exemption for aircraft that weigh less than 55 pounds, operate during daytime VFR conditions, operate within VLOS, and stay certain prescribed distances away from airports or heliports. *See* FAA, *FAA Streamlines UAS COAs for Section 333* (rev. Mar. 24, 2015), https://www.faa.gov/news/updates/?newsId=82245. This blanket COA allows flights anywhere in the country

N. All UAS operated in accordance with this exemption will be identified by serial number, registered in accordance with 14 C.F.R. Part 47, and have identification (N-Number) markings in accordance with 14 C.F.R. Part 45, Subpart C. Markings will be as large as practicable.

O. Caterpillar has developed procedures to document and maintain a record of the UAS maintenance, preventative maintenance, alterations, status of replacement/overhaul component parts, and the total time in service of the UAS, as reflected in the Manual.

P. Each UAS operated under this exemption will comply with all manufacturer Safety Bulletins.

Q. The preflight inspection section described in the Manual will account for all discrepancies (*i.e.*, inoperable components, items, or equipment).

R. Caterpillar's use of radio frequency spectrum for operation and control of the UAS will comply with the Federal Communications Commission (FCC) or other appropriate agency requirements.

S. The documents required under Sections 91.9 and 91.203 will be available to the PIC at the GCS of the UAS any time the aircraft is operating. These documents will be made available to FAA or any law enforcement official upon request.

T. The UAS will remain clear and yield the right of way to all manned operations and activities at all times.

U. UAS operations will not be conducted at night, as defined in Section 1.1. All operations will be conducted under visual meteorological conditions (VMC).

V. The UAS will not be operated from any moving device or vehicle.

W. The UAS will not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than three statute miles from the PIC.

X. The UAS will not operate within five 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 Caterpillar. The letter of agreement with the airport management will be made available to FAA and any law enforcement official upon request.

Y. Any accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area defined by the applicable COA will be reported to FAA's UAS Integration Office (AFS-80) within 24 hours and the National Transportation Safety Board (NTSB), as applicable.

---

except restricted airspace and certain other prohibited areas, and FAA automatically issues it at the time the exemption is approved. *Id*. To the extent Caterpillar will be operating above 200 ft. AGL at any of its UAS sites, it will apply for a COA authorizing it to do so.

VII. Public Interest

Authorizing Caterpillar to conduct commercial operations using UAS under the conditions specified herein would bring immediate and significant safety improvement to the mining, construction, energy and other industries. Caterpillar's UAS would be used to conduct inspections and perform other key functions in a manner that provides at least an equivalent level of safety compared to the current regulatory structure that applies to manned aircraft.[22]

Conventional construction and mining inspections require human beings to visually observe and analyze the physical status of various equipment and surrounding conditions. By replacing these perilous tasks with UAS flights, Caterpillar can identify and analyze any equipment or areas that require attention without subjecting a human to the attendant risks.

VIII. Conclusion

Given the small size of Caterpillar's UAS and the restricted environments where they will operate, Caterpillar falls squarely within the type of operations that Congress intended be authorized pursuant to Section 333. Caterpillar's proposed UAS operations are similar in all material respects to the operations authorized under the Section 333 Grants, including several covering nearly identical types of operations – and should be approved on an expedited basis. Based on the clear direction from Congress, the authority contained in the FMRA; the well-established equivalent level of safety present in Caterpillar's proposed operations; the significant public benefits associated with using UAS to perform the proposed operations; and FAA's recent determinations in the Section 333 Grants, grant of Caterpillar's petition is in the public interest. Accordingly, Caterpillar respectfully requests that FAA grant it an exemption without delay.

Very truly yours,

Gregory N. Harris
Caterpillar Inc.
Attorney
Law & Public Policy/Legal Services Division
100 NE Adams Street
Peoria, IL 61629

Enclosures

[22] *See* Exemption No. 11062 at 22.