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

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

May 22, 2015

Exemption No. 11666
Regulatory Docket No. FAA–2015–0630

Mr. Ryan Murguia
President
AeroView Services, LLC
19645 Seven Ponds Road
Sperry, Iowa 52650

Dear Mr. Murguia:

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 March 11, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of AeroView Services, LLC (hereinafter petitioner or operator) for an exemption. The exemption would allow the petitioner to operate an unmanned aircraft system (UAS) to conduct aerial photography and precision survey.

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 is a Trimble UX5.

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*. 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 requested 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. 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, AeroView Services, 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, AeroView Services, 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 Trimble UX5 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 5 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 May 31, 2017, unless sooner superseded or rescinded.

Sincerely,

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

Enclosures

AeroView Services, LLC

March 11th, 2015

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

Re: Exemption Request Under Section 333 of the FAA Reform Act and Part 11 of the Federal Aviation Regulations

Dear Sir or Madam:

Per Section 333 of the FAA Modernization and Reform Act of 2012 (the "Reform Act") and 14 C.F.R. Part 11, AeroView Services, LLC (AeroView) an operator of the UX5 Unmanned Aircraft System ("UAS" or "UX5"), seeks an exemption from the Federal Aviation Regulations ("FARs") listed below and discussed in Appendix A.[1] Attached as Appendix B is a summary of this request.

AeroView's requested exemption would allow commercial operation of Trimble's model UX5 UAS, which weighs 5.5 lbs. and collects aerial photography and precision surveys. The UX5 takes multiple and overlapping digital images that can be used to produce precision survey point clouds, contour maps and surface triangulation of the surveyed area. The Trimble UX5 can produce valuable deliverables for a range of industries. These industries include agriculture, mining, real estate, oil/gas, disaster response and professional surveying, among others. Use of the UX5 for aerial surveys reduces the need to operate conventional aircraft or deploy survey crews into dangerous areas for the same purpose. The UX5 provides professional imagery at a fraction of the cost, time and risk required for a survey using conventional aircraft or ground crews. These benefits directly correlate to improved safety, efficiency, productivity as well reduced environmental impact.[2]

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[1] *See* Pub. Law 112-95, 126 Stat. 11, § 333 (2012). Trimble has received a SAC the UX5 issued on August 28, 2014 (Exhibit 5).

[2] *See, e.g.* Jack Nicas, *Drones Find Fans Among Farmers, Filmmakers,* WALL STREET JOURNAL (March 10, 2014, 7:45 PM) (describing how an overseas surveyor used to spend 25,000 Euro ($34,345) to survey 15 square kilometers with a team of 12 surveyors, and it would take 2 to 3 weeks to collect all the data. With a Trimble UX5, he accomplished the same task for 5,000 Euro and got all the data he needed in 3 to 4 days. Because the surveys cost him less to perform, he passes those savings on to his customers.), *available at*: http://online.wsj.com/news/articles/SB10001424052702304732804579425342990070808.

AeroView's operations under this exemption will be subject to specific conditions and operating procedures to ensure, at the least, an equivalent level of safety to currently authorized operations using manned aircraft and under conditions as may be modified by the FAA as required by Section 333.

The requested exemption would authorize commercial operations of aerial surveys and photography using the UX5, which at 5.5 lbs. is small in size.[1] The UX5 will be operated under controlled conditions at low altitude in airspace that is limited in scope, as described more fully below; it will have automated control features, as described below. The UX5 also will be operated by an individual who possesses at least a private pilot certificate and third-class airman medical certificate and completed a manufacturers authorized UX5 operators training. Finally, the airspace in which the UAS will operate will be disclosed to the FAA in advance, through filing filing a Notice to Airmen (NOTAM).

AeroView submits that because this small, unmanned aerial vehicle—the UX5—will be used in lieu of comparatively hazardous operations now conducted with fixed wing and rotary conventional aircraft, the FAA can have confidence that the operations will achieve at least an equivalent level or greater level of safety. Approval of this exemption would thereby enhance safety and fulfill the Secretary of Transportation's (the FAA Administrator's) responsibilities under Section 333(c) of the Reform Act to "establish requirements for the safe operation of such aircraft systems in the national airspace system."

The name and address of the applicant are:

Ryan Murguia
19645 7 Ponds Road
Sperry, Iowa 52650
Ph: 319-572-2215
Email: ryanm@aeroviewservices.com

The regulations from which the exemption is requested are as follows:

14 C.F.R. Part 21;
14 C.F.R. 45.23(b);
14 C.F.R. 61.113(a) & (b);
14 C.F.R. 61.133(a);
14 C.F.R. 91.7(a);
14 C.F.R. 91.9(b)(2);
14 C.F.R. 91.109(a);
14 C.F.R. 91.119;
14 C.F.R. 91.151(a);
14 C.F.R. 91.203(a) & (b);
14 C.F.R. 91.405(a);

[1]Trimble has received a SAC for the UX5 issued on August 28, 2014 (Exhibit 5).

14 C.F.R. 91.407(a)(1); 14 C.F.R. 91.409(a)(2); 14 C.F.R. 91.417(a).

Appendix A discusses each rule listed above and explains why exemptions pursuant to the proposal set forth in this letter are appropriate, provide an equivalent level of safety, and are in the public interest.

THE APPLICABLE LEGAL STANDARD UNDER SECTION 333

AeroView submits that grant of this exemption application for use of the UX5 in precision aerial surveys will advance the Congressional mandate in Section 333 of the Reform Act to accelerate the introduction of UAS's into the national airspace system ("NAS") if it can be accomplished safely. This law directs the Secretary of Transportation to consider whether certain UASs may operate safely in the NAS before completion of the rulemaking required under Section 332 of the Reform Act. In making this determination, the Secretary is required to determine which types of UASs 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's 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.

Reform Act § 333(a)(1). 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." *Id.* §333(c) (emphasis added).[2]

The Federal Aviation Act expressly grants the FAA the authority to issue exemptions. This statutory authority, by its terms, includes exempting civil aircraft, as the term is defined under §40101 of the Act, from the requirement that all civil aircraft must have a current airworthiness certificate and those regulations requiring commercial pilots to operate aircraft in commercial service:

> The Administrator may grant an exemption from a requirement of a regulation prescribed under subsection (a) or (b) of this section or any of sections 44702-44716 of this title if the Administrator finds the exemption is in the public interest.

49 U.S.C. §44701(f). *See also* 49 USC §44711(a); 49 USC §44704; 14 CFR §91.203(a)(1).

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[2] Applicant submits that this provision places a duty on the Administrator to not only process applications for exemptions under Section 333, but for the Administrator, if he deems the conditions proposed herein require modification in order to allow approval, to supply conditions for the safe operation of the UAS. AeroView welcomes the opportunity to consult with FAA staff in order to address any issues or concerns that this proposal may raise that they believe may require modification.

The grant of the requested exemption is in the public interest based on the clear direction in Section 333 of the Reform Act; the additional authority in the Federal Aviation Act, as amended; the strong equivalent level of safety surrounding the proposed operations; and the significant public benefit, including enhanced safety and cost savings associated with transitioning to UASs for aerial survey photography. Accordingly, the applicant respectfully requests that the FAA grant the requested exemption without delay.

Airworthiness of the UX5

A critical element of the exemption application involves evidence of the airworthiness of the UX5. Trimble believes that it has shown compliance with the requirements of Order 8130.34C, Airworthiness Certification of Unmanned Aircraft Systems and Optionally Piloted Aircraft, through the SAC review process. The UX5 was issued a SAC on August 28, 2014. The criteria set forth in the Order specify the substantive showings of the device's safety and fitness for operation to ensure that the FAA has sufficient basis to evaluate the aircraft's safety.[3] AeroView submits that issuance of a SAC for the UX5 provides assurance of the public safety for the aircraft type.

Mandatory Operating Conditions

Grant of the exemption to AeroView will be subject to the following mandatory conditions, which are based upon operating conditions set forth for operation of UAS by public entities pursuant to Certificates of Authorization, with additional restrictions:

1) Operations authorized by this grant of exemption are limited to the following aircraft described in the operator's manual which is a fixed-wing aircraft weighing less than 6 pounds: Trimble Navigation Limited UX5 UAS. Proposed operations of any other aircraft will require a new petition or a petition to amend this grant.

2) The UA may not be flown at an indicated airspeed exceeding 74.5 knots.

3) The UA must be operated at an altitude of no more than 400 feet above ground level (AGL), as indicated by the procedures specified in the operator's manual. All altitudes reported to ATC must be in feet AGL.

4) 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.

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[3] AeroView is submitting under a request for confidentiality the following documents in support of this exemption application for the UX5: 1) Safety Checklist (Exhibit 1); 2) Training Manual (Exhibit 2); and 3) Maintenance & Inspection Manual for the UX5 (Exhibit 3). Trimble has also submitted these documents on a confidential basis to the FAA as part of the SAC application process under Part 21. *See also* "User Guide -- Trimble UX5 Aerial Imaging Solution," attached as Exhibit 4 and also being submitted on a confidential basis. The SAC issued on August 28, 2014 is attached as Exhibit 5 and being submitted on a confidential basis.

5) All operations must utilize a visual observer (VO). The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The PIC cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the functions prescribed in the operator's manual.

6)The operator must follow the procedures as outlined in its operator's manual.
The operator may update or revise its operator's manual. It is the operator's responsibility to track such revisions and present updated and revised documents to a FAA Administrator upon request. The operator must also present updated and revised documents if it petitions for an extension or amendment of this 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 amendment to its exemption.

7) Prior to each flight the PIC must 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, 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. The Ground Control Station must be included in the preflight inspection. All maintenance and alterations must be properly documented in the aircraft records.

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 in accordance with the operator's manual. The PIC who conducts the functional test flight must make an entry in the UAS aircraft records of the flight. The requirements and procedures for a functional test flight and aircraft record entry must be added to the operator's manual.

9) The preflight inspection section in the operator's manual must be amended to include the following requirement: The preflight inspection must account for all discrepancies, i.e. inoperable components, items, or equipment, not covered in the relevant preflight inspection sections of the operator's manual.

10) The operator must follow the manufacturer's UAS aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements, with particular attention to flight critical components that may not be addressed in the manufacturer's manuals.

11) AeroView must carry out its maintenance, inspections, and record keeping requirements in accordance with the operator's manual. Maintenance, inspection, and alterations must be noted in the aircraft logbook, including total flight hours, description of work accomplished, and the signature of the authorized UX5 technician returning the UX5 to service.

12) UX5 technicians must receive and document training referenced in the operator's manual.

13) Each UAS operated under this exemption must comply with all manufacturer System and Safety Bulletins.

14) AeroView UX5 maintenance personnel must make a record entry in the UAS logbook or equivalent document of the corrective action taken against discrepancies discovered between inspections.

15) The PIC must possess at least a private pilot certificate and a third-class airman medical certificate. 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.

16)Prior to operating for hire, the PIC must have completed the manufacturers training as outlined in the Safety Checklist. The Training Manual must also be updated to reflect the specific training syllabus as determined by the manufacturer. The training manual specifies the minimum flight and skill requirements for the Remote Pilot, Instructor Pilot and Examiner. Those Manuals and records of those requirements must be documented and made available upon request by the Administrator. Those minimum flight requirements are repeated here as conditions and limitations:

Remote pilot [PIC]
- Minimum 2 flights on the UX5 as a remote pilot during the Type Rating module
- Minimum 2 flights on the UX5 as visual observer during the Type Rating module
- When failed:Minimum 4 flights on the UX5 for the failed part

Instructor pilot
- A minimum of 25 flights and 4 hours where:

o The flights occurred on 4 different calendar days.

o Two long endurance flights that last near the maximum permissible endurance (40 min for operations conducted under this exemption) or have a minimum duration of 45 min for previously logged flights or flights not conducted under this exemption (per the manufacturer's operator's manual).

o One flight with a minimum measured wind speed of 30 kph (18.64mph). If the wind speed cannot be measured, you can provide proof from METAR as close as 25 km from the weather station.

o One flight with a minimum programmed leg distance of 1 km (if possible by FAA regulations, otherwise as long as possible.)

o 11 flights with a different selected height where:

o2 flights are at the minimum height

o 2 flights are at the maximum allowable height

Examiner
- 100 flights and 20 hours (regardless of aircraft type) or as approved by a team of examiners.

Prior documented flight experience that was obtained in compliance with applicable regulations may satisfy this requirement. Training, proficiency, and experience-building flights that can also be conducted under an exemption are permitted to accomplish the required flights and flight time.

17) 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 and land or be recovered in accordance with the operator's manual.

18) The PIC must abort the flight in the event of unpredicted obstacles or emergencies in accordance with the operator's manual.

19) The PIC is prohibited from beginning a UX5 flight unless (considering wind and forecast weather conditions) there is enough power to fly to the first point of intended landing and, assuming normal cruising speed, to fly after that for at least 10 minutes.

20) The operator must obtain an Air Traffic Organization (ATO) issued Certificate of Waiver or Authorization (COA) prior to conducting any operations under an exemption. This COA will also require the operator to request a Notice to Airman (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to the operation.

21)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.

22) Before conducting operations, the radio frequency spectrum used for operation and control of the UA must comply with the Federal Communications Commission (FCC) or other appropriate government oversight agency requirements.

23) The 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 yield the right of way to all other manned operations and activities at all times (including, but not limited to, ultralight vehicles, parachute activities, parasailing activities, hang gliders, etc.).

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

26) UAS operations may not be conducted during night, as defined in 14 CFR 1.1.

27) All operations shall be conducted in Class G airspace.

28)All operations must be conducted under visual meteorological conditions (VMC). 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.

29) During operations in Class G airspace, the UA may not operate within 5 nautical miles of the geographic center of an airport as denoted on a current FAA-published aeronautical chart unless a letter of agreement with that airport's management is obtained, and the operation is conducted in accordance with a NOTAM as required by the operator's COA. The letter of agreement with the airport management must be made available to the Administrator upon request.

30) The UA may not be operated over congested or densely populated areas. These areas include but are not limited to the yellow areas depicted on World Aeronautical Charts (WAC), Sectional Aeronautical Charts (Sectionals), or Terminal Area Charts (TAC). However, aeronautical charts may not reflect pertinent local information. Ultimately, it is the PIC's responsibility to maintain the minimum safe altitudes required by § 91.119.

31)Operation of the UA must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures.

32)Operations of the UA may be conducted at distances less than 500 feet from participating persons, vessels, vehicles or structures that perform an essential function in connection with these special purpose operations. Operations closer than 500 feet from the PIC, VO, operator trainees and essential persons, are permitted when operationally necessary; but never so close as to present an undue hazard, per § 91.119(a).

33)Operations of the UA may be conducted at distances less than 500 feet from unoccupied vessels, vehicles or structures owned by the land owner/controller when the land owner/controller grants such permission and the PIC makes a safety assessment of the risk from operations closer to these objects.

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

35) 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.

36) The PIC must, 15 minutes prior to and during all UAS operations monitor an airband transceiver providing communication on the International Aircraft Communication Band for active aircraft in the area.

Operator Requirements

AeroView respectfully proposes that operator requirements should take into account the characteristics of the particular UAS. Certain UASs, such as the Trimble UX5, are characterized by a high degree of pre-programmed control and various built-in technical capabilities that limit the potential for operation outside of the operating conditions set forth above.

The UX5 has a semi-autonomous navigation and control system comprised of a Ground Control Station (GCS) and autopilot system. All flights are pre-programmed with GPS guidance and do not require human intervention. Flight mission area and routing cannot be changed after launch. Flights are not directed by positive manual control, nor are evasive maneuvers. In the case of unplanned events, the operator inputs pre-programmed evasive maneuvers from the control unit

and the control unit executes that maneuver. Pre-programmed operator interventions include diversion to the right; initiation of holding at present position; suspension of mission; fly back to launch point; fly to point and hold; abort mission and land; and emergency power cut off and land (Flight Termination System).[4]

Additional automated safety functions and safety enhancing features of the UX5 include the following:

- Auto-pilot detection of lost GPS or of insufficient satellites initiates an immediate spiral landing.
- Low power on the aircraft triggers escalating alarms at GCS at 35% and 10% levels.
- If the auto-pilot detects a lost-link to the GCS for longer than 30 seconds, landing procedure begins.
- The UX5 is inherently unstable, an auto-pilot fail will result in very rapid exit from flight.
- Aircraft has an on-board failsafe that limits speed in the event of dive to approximately 14 m/s.
- The aircraft, weighing less than 6 lbs., fully loaded, is constructed of EPP foam, or similar material which is intended to absorb impact energy.[5]
- The motor is driven by a pulse width modulated signal, not an analog signal.

Given these safety features, AeroView proposes that operators of the UX5 should not be required to hold a commercial pilot certification. Instead, operators should be required to:

- Possess at least a private pilot certificate and third-class airman medical certificate. Have completed the manufacturer's operator training program.

AeroView notes that the FAA has found that safety factors permitted operation of UASs by operators with these qualifications in the case of operations pursuant to public COAs when the mandatory operating conditions specified above were present. *See* Federal Aviation Administration, Notice N-8900.227, Unmanned Aircraft Systems (UAS) Operational Approval, at 20-21 (July 30, 2013). The FAA has the statutory authority to grant exemptions to the requirements for and privileges associated with the grant of airmen's certificates. 49 USC §44701 (f).

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[4] Gatewing staff have performed over 1,245 flights, logging more than 291 hours of flight time with the predecessor of the UX5, the X-100. Development of the UX5 included 100 early demo/beta flights. These flights amounted to about 25 hours. There have been about 300 training flights for the UX5, totaling about 75 hours. The UX5 has 204 registered test flights, amounting to approximately 51 hours, and 478 registered production flights, amounting to approximately 120 hours. Gatewing and Trimble do not keep data on flights conducted by customers, but they are estimated to have reached well over 1,000 hours.

[5] Trimble has calculated the potential energy in flying the UX5. Based on a maximum speed in descent of 14m/s built into the autopilot and the UX5's mass of 2.5kg, these calculations yield 300 Joules of energy. Applying the Canadian regulatory standard of energy/area, the UX5 is calculated to be 5.9 J/cm2. Canada is proposing to apply no regulation to a UAS below 15 J/cm2.

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* * *

In summary, applicant seeks an exemption from the FARs set forth above and in Appendix A to allow commercial operations of a small unmanned vehicle conducting precision aerial surveys.

Approval of the exemption allowing commercial operations of the UX5 for precision survey and photography work will enhance safety by reducing risk. Conventional aerial survey operations, using jet or piston-powered aircraft present risks associated with vehicles that weigh in the neighborhood of 5,000 to 7,000 lbs., or more, carry large quantities of fuel, passengers, and, in some cases, cargo. Such aircraft must fly to and from the survey location. In contrast, a UX5 weighing less than 6 lbs. and powered by batteries eliminates a portion of that risk given the reduced mass and lack of combustible fuel carried on board. The UX5 is carried to the survey location, not flown there. The UX5 will carry no passengers or crew and, therefore, will not expose any individuals to the risks inherent with manned aircraft flights.

Additionally, no national security issue is raised by the grant of the requested exemptions. Given the size, load carrying capacity, speed at which it operates, and the fact that it carries no explosives or other dangerous materials, the UX5 poses no threat to national security.
The operation of the UX5, weighing less than 6 lbs., for precision surveys in accordance with the strict conditions outlined above, will provide an equivalent level of safety supporting the grant of the exemptions requested herein, including exempting AeroView from the requirements of Part 21.

The UX5's satisfaction of the criteria set forth in Section 333 of the Reform Act—size, weight, speed, operating capabilities, lack of proximity to airports and populated areas, operation within visual line of sight, and national security—and its showing of an equivalent level of safety as it may relate to the requirement for a pilot's license, provide more than adequate justification for the grant of the requested exemptions allowing commercial operation of the UX5 in the commercial precision aerial survey and photographic business.

Respectfully submitted,

Ryan Murguia
President
AeroView Services, LLC

Encl:
cc: Zach Pieper

APPENDIX A

EXEMPTION REQUEST AND EQUIVALENT LEVEL OF SAFETY SHOWINGS UNDER APPLICABLE RULES SUBJECT TO EXEMPTION

AeroView requests an exemption from the following regulations as well as any additional regulations that may technically apply to the operation of the UX5:

14 C.F.R. § 45.23(b): Marking of the Aircraft

The regulation provides:

> 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.

The UX5 has no entrance to the cabin, cockpit, or pilot station on which the word "Experimental" can be placed. Given the size of the UAV, two-inch lettering will be impossible. The word "Experimental" will be placed on the forward fuselage in compliance with § 45.29(f).

The equivalent level of safety will be achieved by having the UX5 marked on its forward fuselage as required by § 45.29(f) where the pilot, observer, and others working with the UAV will see the identification of the UAS as "Experimental." The FAA has issued the following exemptions to this regulation to Trimble, Exemption No. 10700, and to others, including Exemption Nos. 8738, 10167 and 10167A.

14 C.F.R. Part 21, Subpart H: Airworthiness Certificates
14 CFR § 91.203(a)(1)

Section 91.203(a)(1) requires all civil aircraft to have a certificate of airworthiness. Part 21, Subpart H, entitled Airworthiness Certificates, establishes the procedural requirements for the issuance of airworthiness certificates as required by FAR § 91.203(a)(1). Given the size of the aircraft (5.5lbs.) and the limited operating area associated with its utilization, it is unnecessary to go through the certificate of airworthiness process under Part 21 Subpart H to achieve or exceed current safety levels.

Such an exemption meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the Reform Act. The Federal Aviation Act and Section 333 of the Reform Act 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 UAS involved.

In this case, an analysis of these criteria demonstrates that the UX5 operated without an airworthiness certificate, under the conditions proposed herein, will be at least as safe, or safer, than a conventional aircraft (fixed wing or rotorcraft) with an airworthiness certificate. The UX5 weighs less than 6 lbs. fully loaded. It will not carry a pilot or passenger, will not carry flammable fuel, and will operate exclusively within an area pre-disclosed and in compliance with conditions set forth herein. Operations under this exemption will be tightly controlled and monitored by both the operator, pursuant to the conditions set forth above, and by local public safety requirements. The FAA will have advance notice of all operations through the filing of NOTAMs. Receipt of the prior permission of the land owner, the size of the aircraft, the lack of flammable fuel, and the fact that the aircraft is carried to the location and not flown there all establish the equivalent level of safety. The UX5 construction with absorbent material provides at least an equivalent level of safety to that of such operations being conducted with conventional aircraft that would be orders-of-magnitude larger and would be carrying passengers, cargo, and flammable fuel.

14 C.F.R. § 61.113(a) & (b); 61.133(a): Private Pilot Privileges and Limitations; Pilot in Command; Commercial Pilot Privileges and Limitations.

Section 61.113(a) & (b) limit private pilots to non-commercial operations. Unlike a conventional aircraft that carries a pilot, passengers, and cargo, the UX5 in this case is remotely controlled with no passengers or property of others on board. Section 61.133(a) requires an individual with a commercial pilot's license to be pilot in command of an aircraft for compensation or hire. AeroView respectfully proposes that operator requirements should take into account the characteristics of the particular UAS. Trimble's UX5 has a high degree of pre-programmed control and various built-in technical capabilities that strictly limit the potential for operation outside of the operating conditions set forth in the exemption application.

The UX5 has a semi-autonomous navigation and control system comprised of a Ground Control Station (GCS) and auto-pilot system. All flights are pre-programmed with precision GPS guidance and do not require human intervention. Flight mission area and routing cannot be changed after launch. Flights are not directed by positive manual control, nor are evasive maneuvers. In the case of unplanned events, the operator inputs pre-programmed evasive maneuvers from the control unit, and the control unit executes that maneuver. Pre-programmed operator interventions include diversion to the right; initiation of holding at present position; suspension of mission; fly back to launch point; fly to point and hold; abort mission and land; and emergency power cut off and land (Flight Termination System).

Additional automated safety functions and safety enhancing features of the UX5 include the following:

- Auto-pilot detection of lost GPS or of insufficient satellites initiates an immediate spiral landing.
- Low power on the aircraft triggers escalating alarms at GCS at 35% and 10% levels.
- If the auto-pilot detects a lost-link to the GCS for longer than 30 seconds, landing procedure begins.
- The UX5 is inherently unstable, so autopilot fail will result in very rapid exit from flight.
- Aircraft has an on-board failsafe that limits speed in the event of dive to approximately 14 m/s.

- The aircraft, weighing less than 6 lbs., fully loaded, is constructed of EPP foam, or similar material which is intended to absorb impact energy.
- The motor is driven by a pulse width modulated signal, not an analog signal.

Given these safety features, AeroView proposes that PIC of the UX5 should be required to hold a private pilot certification and third class airman medical certificate. Also, PIC should be required to:

- have completed the manufacturer's training program for operation of the UAS. The manufacturer's training program has been reviewed through the SAC process. An SAC was issued for the UX5 on August 28, 2014.

AeroView notes that the FAA has found that safety factors permitted operation of UASs by operators with these qualifications in the case of operations pursuant to public COAs where the mandatory operating conditions specified above are present. *See* Federal Aviation Administration, Notice N-8900.227, Unmanned Aircraft Systems (UAS) Operational Approval, at 20-21 (July 30, 2013). The FAA has the statutory authority, granted at 49 U.S.C.§44701(f) to waive the pilot requirements for commercial operations.

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

This regulation requires that no person may operate a civil aircraft unless it is in airworthy condition. Should the exemption be granted allowing commercial operation of the UX5 without an airworthiness certificate, no standard will exist for airworthiness of the UX5. Given the size of the aircraft and the requirements that have presumably already been met in the SAC approval process for the UX5 (for instance, the UX5's Maintenance & Inspection Manual and Safety Checklist), an equivalent level of safety will be achieved by ensuring compliance with the Trimble UX5 manuals prior to each flight.

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

The regulation provides:

> 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.

Given the size and configuration of the UX5, it has no ability or place to carry such a flight manual on the aircraft, not only because there is no pilot on board, but because there is no room or capacity to carry such an item on the aircraft.

The equivalent level of safety will be achieved by keeping the flight manual (*see, e.g.*, User Guide, Exhibit 4) at the ground control point where the pilot flying the UAS will have immediate

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

14 C.F.R. § 91.109 & 91.319(a)(1): Flight Instruction

These regulations provide 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 functioning dual controls.

The UX5 is a remotely piloted aircraft and by design, does not have fully functional dual controls. Flight control is accomplished through the use of a control box that communicates with the aircraft via radio communications. The flight plan is pre-programmed into the autopilot before flight and only in unusual circumstances will the pilot input control functions to alter the pre-programmed flight. If instruction is accomplished through a training program, as set forth in Exhibit 2, an equivalent level of safety will be assured. 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. *See* Exemption Nos. 5778K & 9862A. The equivalent level of safety will be achieved by the manufacturer providing the training as outlined, for example, in Exhibit 2 and through the use of experienced and qualified pilots familiar with the UX5.

14 CFR § 91.119: Minimum Safe Altitudes

Section 91.119 establishes safe altitudes for operation of civil aircraft. Specifically, 91.119(c) limits aircraft flying over areas other than congested areas to 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.

As set forth herein, the UX5 will never operate at higher than 400 feet AGL. It will, however, be operated to avoid congested or populated areas that are depicted in yellow on VFR sectional charts. Because aerial survey work must be accomplished at relatively low altitudes and at altitudes less than 500 feet AGL, an exemption from Section 91.119(c) is needed.

The equivalent level of safety will be achieved given the size, weight, speed, and material with which the UX5 is built. Also, no flight will be taken without the permission of the land owner or those who control the land. Because of the advance notice to the landowner, all affected individuals will be aware of the survey flights. Compared to aerial survey operations conducted with aircraft or rotorcraft weighing far more than 5.5 lbs. and carrying flammable fuel, any risk associated with these operations will be far less than those currently allowed with conventional aircraft operating at or below 500 feet AGL. Indeed, the low-altitude operations of the UAS will maintain separation between these small-UAS operations and the operations of conventional aircraft that must comply with Section 91.119.

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

This regulation 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."

The UX5 batteries provide approximately 50 minutes of powered flight. Without an exemption from § 14 CFR 91.151, the UAS's flights would be limited to approximately 20 minutes in length. Given the limitations on its proposed operations and the location of those proposed operations, a longer time frame for flight in daylight VFR conditions is reasonable.

AeroView believes that an exemption from 14 CFR § 91.151(a) is safe and within the scope of a prior exemption. *See* Exemption 10673 (allowing Lockheed Martin Corporation to operate without compliance with 91.151(a)). Operating the small UAS, without 30 minutes of reserve fuel does not engender the type of risks that Section 91.151(a) was meant to prevent given the size and speed at which the UAS operates. The fact that it carries no pilot, passenger, or cargo also enhances its safety. Additionally, limiting UX5 flights to 20 minutes would greatly reduce their utility. In the unlikely event that the UX5 should run out of fuel, it would simply land. Given its weight and construction material, the risks are less than contemplated by the current regulation.

AeroView believes that an equivalent level of safety can be achieved by maintaining 10 minutes of reserve fuel, which, allowing 40 minutes of flight time, would be more than adequate to return the UAS to its planned landing zone from anywhere in its operating area.

Trimble holds an Exemption from this FAR, Exemption No. 10808 for its X-100 UAS and applied for such an exemption for the UX5 as part of its SAC application. Similar exemptions have been granted to others, including Exemptions 2689F, 5745, and 10673.

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

This regulation provides as follows:

> (a) . . . no person may operate a civil aircraft unless it has . . . 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.

The UX5 fully loaded weighs no more than 6 lbs. As such, there is no ability or place to carry certification and registration documents or to display them on the UAS. In addition, there is no pilot on board the aircraft.

An equivalent level of safety will be achieved by keeping these documents at the ground control point where the pilot flying the UAS 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.

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14 C.F.R. § 91.405(a); 407(a)(1); 409(a)(2); 417(a): Maintenance Inspections

Section 91.405(a) requires 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 . . . ." Section 91.407 similarly makes reference to requirements in Part 43; Section 91.409(a)(2) requires an annual inspection for the issuance of an airworthiness certificate. Section 91.417(a) requires the owner or operator to keep records showing certain maintenance work that has been accomplished by certificated mechanics, under Part 43, or licensed pilots and records of approval of the aircraft for return to service.

Maintenance of the UX5 will be accomplished by the owner/operator pursuant to the manuals, such as Exhibit 3, provided by the manufacturer. An equivalent level of safety will be achieved because the UAS is small in size, will carry no external payload, will operate only in restricted predetermined areas and is not a complex mechanical device. As provided in the attached Maintenance Manual and the Safety Checklist, which were reviewed as part of Trimble's SAC application, the operator of UX5 will ensure that the UAS is in working order prior to initiating flight, perform required maintenance, and keep a log of any maintenance that is performed. Moreover, the operator is the person most familiar with the aircraft and is best suited to maintain the aircraft in an airworthy condition and to ensure an equivalent level of safety.

The UX5's Maintenance Manual provides for replacement of the airframe every 50 hours of flight. This will ensure an equivalent level of safety to the maintenance requirements in Part 91. In addition, between such airframe replacements, should a mechanical issue arise, the aircraft will either return to its launch site or immediately land.

APPENDIX B

SUMMARY OF TRIMBLE SECTION 333 EXEMPTION REQUEST

AeroView hereby provides pursuant to Part 11 a summary of its exemption application to allow commercial operation of the UX5 unmanned aircraft in precision aerial survey work. An exemption is requested from the following regulations:

14 C.F.R. Part 21;
14 C.F.R. 45.23(b);
14 C.F.R. 61.113(a) & (b);
14 C.F.R. 61.133(a);
14 C.F.R. 91.7(a);
14 C.F.R. 91.9(b)(2);
14 C.F.R. 91.109(a);
14 C.F.R. 91.119;
14 C.F.R. 91.151(a);
14 C.F.R. 91.203(a) & (b);
14 C.F.R. 91.405(a);
14 C.F.R. 91.407(a)(1);
14 C.F.R. 91.409(a)(2); 14 C.F.R. 91.417(a).