



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

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

April 16, 2015

Exemption No. 11345  
Regulatory Docket No. FAA-2015-0048

Ms. M. Anne Swanson  
Cooley LLP  
Counsel  
1299 Pennsylvania Avenue, NW.  
Suite 700  
Washington DC 20004-2400

Dear Ms. Swanson:

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

### **The Basis for Our Decision**

By letter dated January 8, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of PrecisionHawk, Inc. (hereinafter petitioner or operator) for an exemption. The exemption would allow the petitioner to operate an unmanned aircraft system (UAS) to conduct precision aerial surveys, including in agriculture as well as flight demonstrations and structural assessments.

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 Hawkeye Mk-III.

In accordance with the statutory criteria provided in Section 333 of Public Law 112–95 in reference to 49 U.S.C. § 44704, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that the relief from 14 CFR part 21, *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 No. 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, PrecisionHawk, 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.

## Conditions and Limitations

In this grant of exemption, PrecisionHawk, 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 Hawkeye Mk-III 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.nts.gov](http://www.nts.gov).

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

29. The operator must have a motion picture and television operations manual (MPTOM) as documented in this grant of exemption.
30. At least 3 days before aerial filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local Flight Standards District Office (FSDO) with jurisdiction over the area of proposed filming. The 3-day notification may be waived with the concurrence of the FSDO. The plan of activities must include at least the following:
- a. Dates and times for all flights;
  - b. Name and phone number of the operator for the UAS aerial filming conducted under this grant of exemption;
  - c. Name and phone number of the person responsible for the on-scene operation of the UAS;
  - d. Make, model, and serial or N-Number of UAS to be used;
  - e. Name and certificate number of UAS PICs involved in the aerial filming;
  - f. A statement that the operator has obtained permission from property owners and/or local officials to conduct the filming production event; the list of those who gave permission must be made available to the inspector upon request;
  - g. Signature of exemption holder or representative; and
  - h. A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which filming will be conducted and the altitudes essential to accomplish the operation.
31. Flight operations may be conducted closer than 500 feet from participating persons consenting to be involved and necessary for the filming production, as specified in the exemption holder's MPTOM.

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

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

Sincerely,

/s/

John S. Duncan  
Director, Flight Standards Service



M. Anne Swanson  
T: +1 202 776 2534  
aswanson@cooley.com

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January 8, 2015

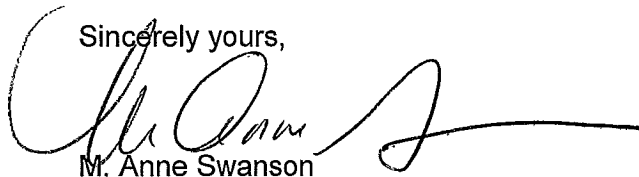
James H. Williams  
Manager  
Unmanned Aircraft Systems Integration Office  
AFS-80  
800 Independence Ave., S.W.  
Washington, D.C. 20591

Dear Mr. Williams:

Enclosed please find an exemption application filed on behalf of PrecisionHawk, Inc. under Section 333 of the FAA Modernization and Reform Act of 2012 and 14 C.F.R. Part 11 to allow commercial operations of unmanned aircraft for precision aerial survey.<sup>1</sup>

Should you or your staff have any questions, please contact the undersigned.

Sincerely yours,



M. Anne Swanson

MAS:taf

Enclosures

cc: Robert Pappas  
Jake Troutman  
Dean Griffith, Esquire  
Thuy H. Cooper  
Christopher Dean, CEO, PrecisionHawk  
Timothy Ravich, General Counsel, PrecisionHawk

<sup>1</sup> Confidential manuals associated with this request, which are exempt from disclosure under the Freedom of Information Act, are being filed under separate cover.



M. Anne Swanson  
T: +1 202 776 2534  
aswanson@cooley.com

January 8, 2015

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

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

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the "Reform Act") and 14 C.F.R. Part 11, PrecisionHawk, Inc. ("PrecisionHawk"), the developer and operator of Small Unmanned Aircraft Systems ("sUASs"), including the Hawkeye Mk-III, seeks an exemption from the Federal Aviation Regulations ("FARs") listed below and discussed in Appendix A.<sup>1</sup> PrecisionHawk seeks exemption from the listed FARs to allow its use of the Hawkeye Mk-III in commercial operations, such as precision aerial surveys, including in agriculture as well as flight demonstrations and structural assessments, so long as such operations are conducted within and under the conditions outlined herein or as established by the FAA in an exemption granted under either Section 333 or Section 49 U.S.C. § 44701(f).<sup>2</sup>

As discussed below, at pages 4-8, PrecisionHawk is willing to abide by conditions the FAA has required in issuing recent Section 333 exemptions, specifically Exemptions 11109 (Clayco, Inc.) and 11110 (Trimble Navigation Ltd.). This agreement on PrecisionHawk's part and the strong similarity of its operations to those approved in Exemptions 11109 and 11110 should give the FAA a basis for prompt consideration and processing of this request.

PrecisionHawk is a leading information delivery company. It proposes to use a small, lightweight UAV – the Hawkeye Mk-III – and proprietary cloud-based software to collect, process, and analyze aerial data principally for purposes of precision agriculture and precision surveying. In doing so, PrecisionHawk would occupy a brand new space in a transformative industry by providing high quality and actionable information to users. Indeed, use of the Hawkeye Mk-III would contribute to various social goods, from environmental protection to improved crop yields. In providing this service, PrecisionHawk would empower crop

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<sup>1</sup> See Pub. Law 112-95, 126 Stat. 11, § 333 (2012).

<sup>2</sup> PrecisionHawk relies upon the following exemptions where specific reference to an exemption is not provided: Exemptions 11062 through 11067, 11080, 11109 through 11112, and 11114.



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researchers and farmers to make better management decisions through software that identifies disease and insects, nutrient deficiencies, and materials for increasing yields with fewer resources.

Operations under the exemption will be subject to strict operating requirements and conditions to ensure at 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.<sup>3</sup>

As described more fully below, the requested exemption would authorize commercial operations of aerial surveys using the Hawkeye Mk-III, which with a maximum take-off weight of 5.5 lbs. is small in size. The Hawkeye Mk-III will be operated under controlled conditions at low altitude in airspace that is limited in scope, as described more fully herein; it will have automated control features, as described herein. The Hawkeye Mk-III also will be operated by an individual possessing a private pilot certificate. Finally, the airspace in which the UAS will operate will be disclosed to the FAA in advance.

PrecisionHawk respectfully submits that because this small, unmanned aerial vehicle – the Hawkeye Mk-III – 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:

PrecisionHawk, Inc.  
Attn: Timothy Ravich, General Counsel  
9001 Glenwood Avenue  
Suite 100  
Raleigh, NC 27617  
Ph: 888.958.1451  
Email: t.ravich@precisionhawk.com

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

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. § 91.119(c);  
14 C.F.R. § 91.151(a);

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<sup>3</sup> While PrecisionHawk is filing this exemption request on its own behalf, it anticipates that purchasers of the Hawkeye Mk-III, in the future, will file exemption applications to allow them to operate the Hawkeye Mk-III in commercial operations on their own farms or at other sites that require precision surveys. Those filings will be substantially similar to this exemption request.



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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) & (b)

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. Appendix B provides the requisite *Federal Register* summary.

### **THE APPLICABLE LEGAL STANDARD UNDER SECTION 333**

PrecisionHawk submits that grant of this exemption application for use of the Hawkeye Mk-III in precision aerial surveys will advance the Congressional mandate in Section 333 of the Reform Act to accelerate the introduction of UASs 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).<sup>4</sup>

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.

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<sup>4</sup> 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 to allow approval, to supply conditions for the safe operation of the UAS. PrecisionHawk 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.



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49 U.S.C. § 44701(f). See also 49 U.S.C. § 44711(a); 49 U.S.C. § 44704; 14 C.F.R. § 91.203(a)(1).

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 surveying. Accordingly, the applicant respectfully requests that the FAA grant the requested exemption without delay.<sup>5</sup>

### **AIRCRAFT AND EQUIVALENT LEVEL OF SAFETY**

The applicant proposes that the exemption requested herein apply to civil aircraft that have the characteristics and that operate with the limitations listed herein. These limitations provide for at least an equivalent or even higher level of safety to operations under the current regulatory structure because the proposed operations represent a safety enhancement to operations that would be conducted with conventional aircraft. These conditions are drawn from Exemptions 11062 through 11067, 11080, 11109, and 11110.

These limitations and conditions to which PrecisionHawk (or "operator") agrees to be bound when conducting commercial operations under an FAA issued exemption include:

1. Operations of the Hawkeye Mk-III are limited to the aircraft described in the attached manuals, which is a miniature propeller airplane built by PrecisionHawk that weighs less than six pounds (the "UA" or "UAS"). Proposed operations of any other aircraft will require a new petition or a petition to amend this grant.<sup>6</sup>
2. The UA may not be flown at an indicated airspeed exceeding 50 knots.
3. The UA may be operated at an altitude of no more than 400 feet above ground level ("AGL"), as indicated by the procedures specified in the attached manuals. All altitudes reported to Air Traffic Control ("ATC") must be in feet AGL.
4. The UA must be operated within visual line of sight ("VLOS") of the pilot-in-command ("PIC") at all times. This requires the PIC to be able to use human vision unaided by any

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<sup>5</sup> In filing this application, PrecisionHawk also is requesting that the FAA combine the grant of the Section 333 exemption with a stand-alone Certificate of Operation ("COA") that will allow commercial operations of the Hawkeye Mk-III without the necessity of filing for a COA for each flight. Compliance with the conditions agreed to herein and that may be imposed by the FAA, as set forth in prior Section 333 exemptions, provide the separation needed from other aircraft. Notice to airmen and notice to air traffic control can be provided by the filing of a NOTAM as set forth within the proposed conditions.

<sup>6</sup> PrecisionHawk is submitting under a request for confidentiality the flight operations manual and an aircraft flight manual for the Hawkeye Mk-III ("manuals").



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device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate.

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 VO and PIC must be able to communicate verbally at all times. 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 functions prescribed in the operator's manual.
6. The manuals must be amended to include all conditions and limitations required by the FAA. The manuals must be maintained and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in the exemption and the procedures outlined in the manuals, the conditions and limitations in the exemption take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in the manuals.

The operator may update or revise the manuals. It is the operator's responsibility to track such revisions and present updated and revised documents to the 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 manuals include this requirement.
9. The preflight inspection section in the manuals includes 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 PrecisionHawk's UA 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.



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11. Operator must carry out its maintenance, inspections, and record keeping requirements in accordance with the manuals. 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 technician returning the UAS to service.
12. The authorized technicians must receive and document training referenced in the manuals.
13. Each UAS operated under the exemption must comply with all PrecisionHawk system and safety bulletins.
14. Operator's 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 C.F.R. 61.56 as to the UAS.
16. The operator may not permit any PIC to operate unless that PIC has demonstrated through PrecisionHawk's training and currency requirements that the PIC is able to safely operate the UA in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from people, vessels, vehicles, and structures.
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 manuals.
18. The PIC must abort the flight in the event of unpredicted obstacles or emergencies in accordance with the manuals.
19. The PIC is prohibited from beginning a UAS 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 will file a request for a Notice to Airmen (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 the exemption must 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 must be as large as practicable.



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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 C.F.R. 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 C.F.R. 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 unless the conditions set forth in #31 are satisfied. These populated 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. Operations must be conducted at least 500 feet from all nonparticipating persons (persons other than the PIC or VO), vessels, vehicles, and structures unless:
  - a. barriers or structures are present that sufficiently protect nonparticipating persons from debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises in which nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately; and/or



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- b. the aircraft is operated near vessels, vehicles, or structures where the land owner/controller has granted permission and the PIC has made a safety assessment of the risk of operating closer to those objects; and
  - c. operations near the PIC or VO do not present an undue hazard to the PIC or VO, per § 91.119(a).
32. 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.
33. In the event COAs are required, any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office ("AFS-80") within 24 hours. Accidents must be reported to the National Transportation Safety Board ("NTSB") per instructions contained on the NTSB Web site: [www.nts.gov](http://www.nts.gov).

\*\*\*\*\*

**Privacy.** All flights will occur over private or controlled access property with the property owner's prior consent and knowledge. Inspection will be in areas where the owners will have consented to the inspections or otherwise have agreed to allow the UAS and the operator to be in the area where inspection will take place.

**National Security.** No national security issue is raised by the grant of this exemption. Given the size, load carrying capacity, speed at which it operates, and the fact that it carries no explosives or other dangerous materials, the Hawkeye Mk-III poses no threat to national security.

\*\*\*\*\*

In summary, PrecisionHawk seeks an exemption from the FARs set forth in Appendix A to operate commercially a small unmanned vehicle (55 lbs. or less) in aerial survey operations.

Approval of this exemption for commercial aerial survey operations will enhance safety by reducing risk. Conventional operations, using jet or piston powered aircraft, operate at extremely low altitudes just feet from the subject being inspected and in extreme proximity to people and structures. Such manned operations present the risks associated with vehicles that weigh in excess of 6,000 lbs., carrying large amounts of jet A or other fuel. Such aircraft must fly to and from the project location. In contrast, a sUAS weighing fewer than six lbs. and powered by batteries eliminates virtually all of that risk given the reduced mass and lack of combustible fuel carried on board. The sUAS is carried to the target area and not flown. The sUAS will carry no passengers or crew and, therefore, will not expose them to the risks associated with manned aircraft flights.



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The operation of small UASs, weighing less than six lbs., conducted in the strict conditions outlined above, will provide an equivalent level of safety supporting the grant of the exemptions requested herein. These lightweight aircraft operate at slow speeds, close to the ground, and in areas that are under the control of the customer. As a result, they are far safer than conventional operations conducted with manned aircraft operating in close proximity to the ground and people.

Satisfaction of the criteria provided in Section 333 of the Reform Act of 2012 – size, weight, speed, operating capabilities, proximity to airports and populated areas, and operation within visual line of sight and national security – provide more than adequate justification for the grant of the requested exemptions allowing commercial operation of applicant's UAS for the Purposes outlined herein and are consistent with exemptions already granted, including Exemptions 11062 through 11067, 11080, 11109 through 11112, and 11114.

Sincerely,

M. Anne Swanson  
Cooley LLP  
Counsel for PrecisionHawk, Inc.

John McGraw  
John McGraw Aerospace Consulting, LLC  
Advisor to PrecisionHawk, Inc.

cc: James Williams  
Robert Pappas  
Jake Troutman  
Dean Griffith, Esquire  
Thuy H. Cooper  
Christopher Dean, CEO, PrecisionHawk  
Timothy Ravich, General Counsel, PrecisionHawk

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

PrecisionHawk requests an exemption from the following regulations as well as any additional regulations that may technically apply to the operation of the Hawkeye Mk-III:

**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 Hawkeye Mk-III 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 any aircraft for compensation or hire. PrecisionHawk respectfully proposes that operator requirements should take into account the characteristics of the particular UAS. PrecisionHawk's Hawkeye Mk-III 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 Hawkeye Mk-III has an autonomous navigation and control system. Flights are pre-programmed with precision GPS guidance and do not require human intervention. In the case of unplanned events, the operator can manually intervene to take one of the following actions:

- (i) command the aircraft to begin to autonomously return to the recovery area and land;
- (ii) command the aircraft to autonomously return to the recovery area where the pilot will assume control and land the aircraft; or (iii) manually assume control of the aircraft via the hand controller and return the craft to the recovery area where the operator lands it.

Additional automated safety functions and safety enhancing features of the Hawkeye Mk-III include the following:

- Auto-pilot detection of lost GPS or of insufficient satellites initiates a stand-by loiter pattern until such time as GPS is re-established or the PIC assumes manual control of the aircraft.
- Low battery power on the aircraft (10.4 volts) triggers the landing sequence and the craft will fly to the recovery area.
- If the auto-pilot detects a lost-link to the ground control station for longer than 30 seconds, landing procedure begins.
- The aircraft, weighing fewer than 6 lbs., fully loaded, is constructed of foam, which is intended to absorb impact energy.
- In the event the ground station reaches a low power state, it will alert the pilot.

Given these safety features, PrecisionHawk proposes that operators of the Hawkeye Mk-III should not be required to hold a commercial pilot certification. Instead, operators should be required to hold only a private pilot certification.

The risks associated with the operation of the Hawkeye Mk-III (given its size, speed, operational capabilities, and lack of combustible fuel) are so diminished from the level of risk associated with commercial operations contemplated by Part 61 with conventional aircraft (fixed wing or rotorcraft)



that allowing operations of the UAS as set forth above meets or exceeds the present level of safety provided under 14 C.F.R. § 61.113(a) & (b) and does not rise to the level of requiring a commercial pilot to operate the aircraft under § 61.133(a).

Given these conditions and restrictions, an equivalent level of safety will be provided by allowing operation of the Hawkeye Mk-III with a private pilot's certificate, under the conditions set forth in the exemption request. The FAA has granted exemptions to conduct similar operations in Exemptions 11062 through 11067, 11080, 11109, and 11110.

#### **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 Hawkeye Mk-III without an airworthiness certificate, no standard will exist for airworthiness of the Hawkeye Mk-III. Given the size of the aircraft and the requirements that the operator has agreed to as relates to airworthiness, as set forth in the attached manuals, an equivalent level of safety will be achieved by ensuring compliance with the PrecisionHawk manuals prior to each flight. The FAA has granted exemptions to conduct similar operations in Exemptions 11062 through 11067, 11080, 11109, and 11110.

#### **14 C.F.R. § 91.119(c): 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 Hawkeye Mk-III 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 Hawkeye Mk-III is built. Also, no flight will be taken without the permission of the landowner or those who control the land as well as local officials. Because of 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 the risks currently posed by 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. The FAA has granted exemptions to conduct similar operations in Exemptions 11062 through 11067, 11080, and 11110.

#### **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 batteries powering the Hawkeye Mk-III provide approximately 60 minutes of powered flight. Without an exemption from § 14 C.F.R. 91.151, the UAS's flights would be limited to approximately 30 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.

PrecisionHawk believes that an exemption from 14 C.F.R. § 91.151(a) is safe and within the scope of prior exemptions. 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. Limiting Hawkeye Mk-III flights to 30 minutes would greatly reduce their utility. In the unlikely event that the Hawkeye Mk-III achieves a low battery state (10.4 volts), it would simply land. Given its weight and construction material, the risks are less than contemplated by the current regulation.

PrecisionHawk believes that an equivalent level of safety can be achieved by maintaining 15 minutes of reserve fuel, which, allowing 45 minutes of flight time, would be more than adequate to return the UAS to its planned landing zone from anywhere in its operating area.

Similar exemptions have been granted to other operators, including Exemptions 2689F, 5745, 10673, 10808, and Exemptions 11062 through 11067, 11080, 11109, 1110, and 11112.

#### **14 C.F.R. § 91.405(a); 407(a)(1); 409(a)(2); 417(a) & (b): 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 Hawkeye Mk-III will be accomplished by the owner/operator pursuant to the manuals attached as confidential exhibits. An equivalent level of safety will be achieved because the UAS is small in size, will carry a small payload, will operation only in restricted predetermined areas and is not a complex mechanical device. As provided in the attached manuals, the operator 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 FAA has granted exemptions for similar operations in Exemptions 11062 through 11067, 11080, 11109, 11110, and 11112.



## APPENDIX B

### **SUMMARY OF PRECISIONHAWK SECTION 333 EXEMPTION REQUEST**

For publication in the *Federal Register*, PrecisionHawk hereby provides pursuant to Part 11 a summary of its exemption application to allow commercial operation of the Hawkeye Mk-III unmanned aircraft in precision aerial survey work. An exemption is requested from the following regulations:

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. § 91.119(c);

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)(2);

14 C.F.R. § 91.417(a) & (b)