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U.S. Department of Transportation
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**Pacific Aviation, LLC's
Petition for Exemption to Operate
Small Unmanned Aircraft Systems**

FAA Regulatory Docket

NAME AND ADDRESS OF PETITIONER

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I. PETITION SUMMARY

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95 (2012), 126 Stat. 11 (“Section 333”) and the Federal Aviation Administration’s (“FAA”) general exemption authority under 49 U.S.C. § 44701(f), Pacific Aviation, LLC (“Petitioner”) hereby petitions for exemptions from 14 C.F.R. Part 21, Subpart H (Airworthiness Certificates), 14 C.F.R. Part 27 (Airworthiness Standards: Normal Category Rotorcraft), 14 C.F.R. §§ 91.7(a), 91.9(b)(2), 91.103(b)(1), 91.109(a), 91.119(c), 91.121, 91.151, 91.203(a) and (b), 91.405(a), 91.407(a)(1) 91.409(a)(2), and 91.417(a)-(b). The proposed exemptions, if granted, would allow Petitioner to conduct commercial operations of small unmanned aircraft systems (“UAS”) weighing 55 pounds or less.

Based on the small size of Petitioner’s UAS, the qualifications and experience of Petitioner’s pilot, and the limited environments within which Petitioner will operate, the requested exemptions fall squarely within the zone of safety envisioned by Congress and set forth in Section 333. Additionally, the enhanced safety achieved by replacing significantly larger manned aircraft carrying crew and flammable fuel with small UAS carrying no passengers or crew and operated under the specific guidelines and procedures proposed by Petitioner gives the FAA good cause to find that the UAS operations enabled by the instant Petition are in the public interest. Thus, the requested exemptions should be granted.

II. **BACKGROUND**

Petitioner is an aviation company that provides a broad range of remote sensing and aviation solutions to private entities and government agencies. Petitioner seeks to build on its 15 plus years of safe operations and utilize its aviation skills and knowledge to offer a range of UAS services in a manner that is consistent with the intent of Congress in enacting Section 333. Petitioner seeks the requested exemptions and a Certificate of Authorization to permit Petitioner to offer on-demand commercial UAS operations for variety of applications including:

- Aerial surveying
- Remote sensing
- Precision agriculture
- Aerial photography
- Wildlife and natural resource monitoring
- Educational /multidisciplinary research.

Petitioner's pilots and technical experts have extensive experience in remote sensing, aviation, data collection, information technology, project management, and natural resource management. Petitioner's approach to UAS integration is aimed at building on Petitioner's preexisting infrastructure and experience for operating within the National Airspace System ("NAS").

III. STATUTORY AUTHORITY

A. Section 333

Section 333, titled “Special Rules for Certain Unmanned Aircraft Systems,” provides a mechanism for seeking expedited FAA authorization of safe civil UAS operations in the NAS. Section 333(a) states that the FAA “shall determine if certain unmanned aircraft systems may operate safely in the national airspace system before completion of the [comprehensive] plan and rulemaking required by section 332(b)(1) of this Act or the guidance required by section 334 of this Act.” In Section 332(b)(1), Congress made it clear that Section 333 provides a mechanism for “expedited operational authorization.”

Section 333(b) identifies several factors that the FAA should consider in determining whether commercial UAS operations should be approved. These include UAS that, “as a result of their size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight do not create a hazard to users of the [NAS] or the public or pose a threat to national security.” *See* Section 333(b).

B. Section 44701(f)

In addition to the specific authority conferred by Section 333, the FAA Administrator has general authority to grant exemptions from the FAA’s safety regulations and minimum standards when the Administrator decides a requested

exemption is in the public interest. *See* U.S.C. § 44701(f).

IV. REQUESTED EXEMPTIONS

Petitioner requests relief from the following regulations:

Part 21 prescribes, in pertinent part, the procedural requirements for issuing and changing design approvals, production approvals, airworthiness certificates, and airworthiness approvals.

Part 27 sets forth airworthiness standards for normal category rotorcraft.

Section 91.7(a) prescribes, in pertinent part, that no person may operate a civil aircraft unless it is in an airworthy condition.

Section 91.9(b)(2) prohibits operation of U.S. registered civil aircraft 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.

Section 91.103(b)(1) states, in pertinent part, that each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight, to include, "For any flight, runway lengths at airports of intended use, and the following takeoff and landing distance information:... For civil aircraft for which an approved Airplane or Rotorcraft Flight Manual containing takeoff and landing distance data is required, the takeoff and landing distance data contained therein."

Section 91.109(a) provides that “no person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls.”

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

Section 91.121 requires, in pertinent part, each person operating an aircraft to maintain cruising altitude by reference to an altimeter that is set “to the elevation of the departure airport or an appropriate altimeter setting available before departure.”

Section 91.151(a) prescribes that no person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed, (1) during the day, to fly after that for at least 30 minutes; or (2) at night, to fly after that for at least 45 minutes.

Section 91.203 prohibits, in subpart (a), any person from operating a civil aircraft unless it has within it (1) an appropriate and current airworthiness certificate; and (2) an effective U.S. registration certificate issued to its owner or, for operation

within the United States, the second copy of the Aircraft Registration Application as provided for in § 47.31(c). Section 91.203 prescribes, in subpart (b), that no person may operate a civil aircraft unless an airworthiness certificate or a special flight authorization issued under § 91.715 legible to passengers or crew is displayed at the cabin or cockpit entrance.

Section 91.405(a) requires, in pertinent part, that an aircraft operator or owner shall have the aircraft inspected as prescribed in subpart E of the same part and shall, between required inspections, except as provided in paragraph (c) of the same section, have discrepancies repaired as prescribed in Part 43 of the chapter.

Section 91.407(a)(1) prohibits, in pertinent part, any person from operating an aircraft that has undergone maintenance, preventative maintenance, rebuilding, or alteration unless it has been approved for return to service by a person authorized under § 43.7 of the same chapter.

Section 91.409(a)(2) prescribes, in pertinent part, that no person may operate an aircraft unless, within the preceding 12 calendar months, it has had an inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.

Section 91.417(a) and (b) prescribes, in pertinent part, that-

(a) Each registered owner or operator shall keep the following records for the

periods specified in paragraph (b) of this section:

(1) Records of the maintenance, preventative maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include-(i) A description (or reference to data acceptable to the Administrator) of the work performed; and (ii) The date of completion of the work performed; and (iii) The signature, and certificate number of the person approving the aircraft for return to service.

(2) Records containing the following information:

- (i) The total time in service of the airframe, each engine, each propeller, and each rotor.
- (ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.
- (iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.
- (iv) The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained.

- (v) The current status of applicable airworthiness directives (AD) and safety directives including, for each, the method of compliance, the AD or safety directive number and revisions date. If the AD or safety directive involves recurring action, the time and date when the next action is required.
- (vi) Copies of the forms prescribed by § 43.9(d) of this chapter for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances. (b) The owner or operator shall retain the following records for the periods prescribed:
- (1) The records specified in paragraph (a)(1) of this section shall be retained until the work is repeated or superseded by other work or for 1 year after the work is performed.
- (2) The records specified in paragraph (a)(2) of this section shall be retained and transferred with the aircraft at the time the aircraft is sold.
- (3) A list of defects furnished to a registered owner or operator under § 43.11 of this chapter shall be retained until the defects are repaired and the aircraft is approved for return to service.

V. PETITIONER'S PROPOSED OPERATIONS SATISFY SECTION 333.

Unmanned Aircraft System

Petitioner intends to operate several small UAS under the requested exemptions.

Thus, the following specifications and limitations apply to all UAS for which Petitioner herein seeks an exemption.

The UAS to be operated under this request will be less than 55 lbs. fully loaded, will be operated at a speed of no more than 50 knots, will carry neither a pilot nor passenger and no explosive materials or flammable liquids, and will be operated exclusively in predetermined environments that are controlled as to access. Petitioner's UAS will use a radio frequency spectrum for operation and control that complies with Federal Communications Commission ("FCC") requirements, and will be operated only in accordance with the procedures described in Petitioner's Flight Operations and Procedures Manual.¹

Petitioner's UAS will be equipped with redundant safety mechanisms allowing safe operation after experiencing certain in-flight failures. If a lost-link event occurs, including the loss of ground communications and/or the loss of a GPS signal, Petitioner's UAS will have the ability to perform a pre-coordinated, predictable, automated flight maneuver and return to a predetermined location within a designated security perimeter for landing. The UAS will further have the ability to abort a flight in the event of unpredicted obstacles or emergencies.

The maximum total flight time for each operational flight will be limited to the

¹ *The Flight Operations and Procedures Manual will be submitted separately and confidentially under 14 C.F.R. 11.35(b), as the manual contains proprietary information that the applicant has not and will not share with others. The manual contains operating conditions and procedures that are not available to the public and are protected from release under the Freedom of Information Act, 5 U.S.C. §§ 552, et seq.*

amount of time the UAS can be flown and still maintain a reserve battery power of no less than 25%. Thus, good cause exists for granting Petitioner's requested relief from 14 C.F.R. § 91.151(a) (setting forth fuel requirements for flight in VFR conditions).

As for Petitioner's requested exemption from 14 C.F.R. Section 91.109(a), UAS, by their design, typically do not have functional dual controls. Given the size and speed of the UAS, an equivalent level of safe training can be performed without dual controls because no pilot or passengers are aboard the UAS and all persons will be a safe distance away in the event that the UAS experiences any difficulties during flight instruction. The FAA has approved exemptions for flight training without fully functional dual controls for a number of aircraft and for flight instruction in experimental aircraft. *See* Exemption Nos. 5778K and 9862A. Thus, good cause exists for granting the requested relief from 14 C.F.R. § 91.109(a).

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

Regarding Petitioner's requested relief from 14 C.F.R. § 91.121 (Altimeter Settings), Petitioner seeks such relief because Petitioner will not have a typical barometric altimeter onboard the UAS. Instead, altitude information will be provided to the UAS PIC via a digitally encoded telemetric data feed, which downlinks from the aircraft to a ground-based on-screen display. The altitude information will be generated by equipment

installed onboard the UAS, using GPS triangulation, digitally encoded barometric altimeter, radio altimeter, or any combination thereof. Prior to each flight, a zero altitude initiation point will be established and confirmed for accuracy by the UAS PIC. Thus, good cause exists for granting the requested relief from 14 C.F.R. § 91.121.

Given the size, weight, speed, and limited operating area associated with the aircraft to be utilized by the applicant, an exemption from 14 C.F.R. Part 21, Subpart H (Airworthiness Certificates), subject to certain conditions and limitations, is warranted (if necessary) and meets the requirements for an equivalent level of safety under 14 C.F.R. Part 11 and Section 333. The UAS operated without an airworthiness certificate in the restricted environment and under the conditions and limitations proposed by Petitioner will be at least as safe, or safer, than a conventional aircraft (fixed wing or rotorcraft) operating with an airworthiness certificate issued under 14 C.F.R. Part 21, Subpart H, and not subject to the proposed limitations and conditions.

Petitioner will strictly comply with safety and maintenance procedures included in all applicable UAS manufacturer's instructions and operating manuals. To the extent such information is not included in the guidelines developed by the manufacturers, Petitioners will develop and document maintenance, overhaul, replacement, and inspection requirements, procedures to document and maintain maintenance records with regard to Petitioner's UAS, and UAS technician qualification criteria. Petitioner's operations manuals will include maintenance requirements for Petitioner's UAS,

including “on-condition” maintenance and modifications. In light of these mitigating factors, exemptions from 14 C.F.R. §§ 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b) are warranted.

Regarding Petitioner’s requested relief from 14 C.F.R. § 91.7(a), it is Petitioner’s understanding that, in light of the operating parameters defined herein, Petitioner’s UAS may not require an airworthiness certificate in accordance with 14 C.F.R. Part 21, Subpart H, and exemption from 14 C.F.R. § 91.7(a) may be unnecessary. *See, e.g.*, Exemption No. 11062, Regulatory Docket No. FAA-2014-0352 (explaining no such exemption was necessary for the requested UAS operations). To the extent such an exemption is deemed necessary in this instance; Petitioner asserts that it should be granted in light of the safety procedures proposed herein. In accordance with the pertinent part of 14 C.F.R. § 91.7(b), the PIC shall be responsible for determining whether the aircraft is in a safe condition for flight. Petitioner’s manuals for maintenance and operations shall include safety checklists to be used by the PIC prior to each flight.

Regarding Petitioner’s requested relief from 14 C.F.R. § 91.9(b)(2) (Civil aircraft flight manual, marking, and placard requirements) and § 91.203(a) and (b), (Civil aircraft: certifications required), it is Petitioner’s understanding that relief from these regulations is no longer necessary in light of the FAA Memorandum “Interpretation regarding whether certain required documents may be kept at an unmanned aircraft’s control station,” dated August 8, 2014. To the extent the FAA deems an exemption from

this section necessary for Petitioner's proposed operations, such exemption should be granted in light of the mitigating fact that Petitioner will maintain the documents required under 14 C.F.R. §§ 91.9 and 91.203 at the UAS ground control station during flights.

UAS Pilot-in-Command

Petitioner's UAS pilot-in-command (PIC) will be Petitioner's Managing Member, Owner, and Research Pilot, Bjorn Dahlen. Mr. Dahlen has over 24 years of experience in the aviation industry as a flight instructor, research pilot, chief pilot, director of flight operations, and project manager. Mr. Dahlen's responsibilities have included management of domestic and international flight operations utilizing fixed wing aircraft, pilots, and mechanics. Mr. Dahlen has been responsible for experimental research modifications of aircraft, and has served as the Airborne Science Operations Coordinator for the University of North Dakota, Aerospace as the University developed the sUAS Center of Excellence. In addition, Mr. Dahlen has operated aircraft on research projects carried out by the National Aeronautics and Space Administration ("NASA"), the University of California, Davis, University of Idaho, Montana State University, Stanford University, South Dakota State University, as well as many other public agencies and private companies. Many of the research projects have involved close coordination of multiple research aircraft for in-situ measurements, including icing studies, satellite data verification, and vertical profiles of significant weather systems. His flight experience includes real-time fire-mapping, low level flight operations, maritime surveillance and

near real-time collection and dissemination of aerial imagery in support of farmers and agronomists throughout the Upper Midwest.

Mr Dahlen's relevant training and certifications include:

- Airline Transport Pilot, Multi Engine Land, Single Engine Land Commercial Privileges with Instrument Rating, CFI, CFII, MEI, AGI, CE-500 Type Rating.
- Master's Degree (Geography and Remote Sensing) University of California, Davis.

Mr. Dahlen's academic background and experience developing remote sensing applications and years of experience in aviation make him well-qualified and uniquely suited to operate UAS safely and in the public interest. However, all of the Petitioner's operations will also utilize a visual observer (VO). The VO may be used to satisfy the visual line of sight (VLOS) requirement as long as the PIC always maintains visual line of sight capability. The VO and the PIC will be able to communicate verbally at all times during operational flights.

Regarding Petitioner's requested relief from 14 C.F.R. § 91.103(b)(1), Petitioner will comply with the other applicable procedures and requirements stated in § 91.103(a) and (b). Specifically, the PIC will take all actions including reviewing weather, flight battery requirements, aircraft performance data, and landing and takeoff distances before initiation of a flight. The PIC will also account for all relevant site-specific conditions in their preflight procedures. Risks presented by sun glare will be mitigated by the PIC's and VO's ability to see other air traffic and initiate a return-to-land sequence if needed.

Operating Parameters of Petitioner's UAS

Petitioner's UAS operations will be conducted within a predetermined, access controlled environment. In this controlled environment, Petitioner's operations will remain within Visual Line of Sight (VLOS) of the PIC and VO, below 400 feet AGL, and at speeds below 50 knots. Flights will be operated at a lateral distance of no less than 100 feet from any inhabited structures, buildings, vehicles, vessels, or non-participating persons. The UAS will operate in accordance with the safety and operational requirements of the FOPM. Prior to the operation, a Safety Risk Analysis Plan (SRAP) will be created which includes all safety and operational information necessary to safely carry out the flight. When applicable, all UAS operations will be conducted in accordance with any state or local privacy laws.

Only participating persons will be permitted within the operating area.² As to Petitioner's filming operations, and consistent with the relief typically provided to manned operations under FAA Order 8900.1, Volume 3, Chapter 8, Section 1, Petitioner requests relief from 14 C.F.R. § 91.119(c) with respect to those participating persons, vehicles, and structures directly involved in the performance of the actual filming. Regarding distance from participating persons, the operations manual sets forth safety factors for authorized and consenting production personnel. Because those procedures

² Pursuant to Order 8900.1 V3, C8, S1, as applicable to aerial filming operations, "participating persons" includes all persons associated with the production. Participating persons will be briefed on the potential risk of the proposed flight operations and must acknowledge and accept those risks prior to participation.

are specific to participating persons, no further FSDO or aviation safety inspector approval is necessary for reductions to the distances specified in Petitioner's manual.

Although Petitioner seeks to comply with the waiver process as described in FAA Order 8900.1, Volume 3, Chapter 8, Section 1 (Issue a Certificate of Waiver for Motion Picture and Television Filming), the current section of Order 8900.1 has specific processes that preclude a jurisdictional FAA FSDO from issuing the required Certificate of Waiver, because the section did not originally provide for UAS operations. Thus, Petitioner seeks exemption from the applicable regulations normally waived during that process. Petitioner proposes that the FAA include the required notifications and coordination with jurisdictional FSDOs through the conditions and limitations accompanying the requested exemption, and that the exemption sought herein will take the place of the Certificate of Waiver normally issued by a jurisdictional FSDO under 8900.1. Under this section, for aerial filming operations, Petitioner will notify every FSDO with jurisdiction over the area that Petitioner plans to operate, just as with manned filming operations, and those FSDOs will have the ability to coordinate further conditions and limitations with the UAS Integration Office to address any local concerns.

Petitioner's UAS will remain clear and yield the right of way to all manned operations and activities at all times (including, but not limited to, ultralight vehicles, parachute activities, parasailing activities, and hanggliders). Petitioner will not conduct UAS operations within 5 nautical miles of the geographic center of a non-towered airport unless a letter of agreement with that airport's management is obtained and the

operation is conducted in accordance with a Notice to Airmen (“NOTAM”).

Petitioner will obtain an Air Traffic Organization (“ATO”) issued Certificate of Waiver or Authorization (“COA”) prior to conducting any operations under this grant of exemption. In fulfilling its requirements under the COA, Petitioner will be required to request a NOTAM not more than 72 hours in advance, but not less than 48 hours prior to the operation.

Requested Exemption Promotes the Public Interest

The enhanced safety achieved by replacing significantly larger manned aircraft carrying crew and flammable fuel with small UAS carrying no passengers or crew and operated under the specific guidelines and procedures proposed by Petitioner gives the FAA good cause to find that the UAS operations enabled by the instant Petition are in the public interest. Moreover, as the FAA has already recognized, UAS provide “a greater degree of flexibility, which supplements the current capabilities offered by manned aircraft.” *See* Exemption No. 11062, Regulatory Docket No. FAA-2014-0352, at p. 22.

By granting Petitioner’s requested exemptions, the FAA will help drive development of safe and successful commercial UAS operations and will advance the public knowledge base for such operations. Petitioner is committed to promoting the UAS research efforts of policymakers including the FAA, NASA, and Universities by sharing data from its commercial UAS operations and serving as a resource for future UAS research operations. Thus, the FAA has good cause to grant this Petition.

CONCLUSION

For the foregoing reasons, the exemptions requested herein should be granted and Petitioner should be permitted to conduct small UAS operations in accordance with its manuals and any other operating parameters the FAA deems necessary and appropriate.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Bjorn F. Dahlen", is written over a horizontal line.

Bjorn F. Dahlen

Pacific Aviation, LLC