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

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

July 27, 2015

Exemption No. 12161
Regulatory Docket No. FAA–2015–0488

Mr. Ian R. Hatfield
Arizona Public Service Company
PO Box 53933 Sta 4618
Phoenix, AZ 85072

Dear Mr. Hatfield:

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 February 24, 2015,[1] you petitioned the Federal Aviation Administration (FAA) on behalf of Arizona Public Service Company (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct visual inspections of energy infrastructure.

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 the Microdrone MD4-1000.

[1] On July 9, 2015, the petitioner responded to the FAA's request for information.

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, Arizona Public Service Company 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, Arizona Public Service Company 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 Microdrone, MD4-1000 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 July 31, 2017, unless sooner superseded or rescinded.

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

Enclosures

APS's Petition for Exemption
Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012

APS:

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I. SUMMARY OF PETITION

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 ("Section 333"), Arizona Public Service Company ("APS") hereby respectfully requests expedited approval to use Small Unmanned Aircraft System ("sUAS") under the terms and conditions described in this Petition for Exemption ("Petition") to conduct inspections of energy infrastructure. Arizona Public Service Company also requests the exemptions that are necessary to such approval pursuant to 49 U.S.C. § 44701(f), and 14 C.F.R. § 11.81.[1]

APS seeks to use sUAS to perform visual inspections of vital energy infrastructure, such as transmission and distribution lines and substations and Solar generation fields, in order to further the public interest in the safe and reliable delivery of electricity to customers. Small UAS are ideally suited for inspection of energy infrastructure—they can safely, inexpensively, and quickly deliver high-quality Infrared and digital photo and video, which eliminates the need for physical inspection and thus speeds the process of trouble-shooting, and ultimately increases the reliability of the electric grid. In particular, sUAS allow for safer operations and inspection of the critical infrastructure. Utility workers would be able to conduct inspections without being in close proximity to high-voltage equipment or subject to the height related hazards of bucket trucks or conventional aircraft. They can also facilitate the safe inspection of hard-to-access or environmentally sensitive areas without the use of bucket trucks, helicopters, and other utility vehicles that may have more impact than sUAS. In addition, because of the small size of the craft, there is not the exposure and risk to public safety as with traditional helicopter use. In many cases sUAS can be more efficient and cost effective than traditional methods, which can help to reduce operations and maintenance costs and, perhaps most importantly, provide a means for faster resolution of any problems on the electric system. A reduction to the overall maintenance costs would be of benefit to the public by being able to pass any reduction of costs directly to the rate payer. The public interest is critical to our success and the approval of this request and the provision of the necessary

exemptions will enhance worker and public safety, increase electric system reliability and decrease customer costs.

Moreover, approving the requested use would represent a significant step forward in the Federal Aviation Administration's ("Administration") efforts to integrate sUAS into the national airspace system. Arizona Public Service Company' request provides the Administration with an opportunity to partner with a leading electric energy provider as it works to develop its rulemaking pursuant to the FAA Reauthorization Act of 2012—while doing so for a compelling public purpose and under strict operational and safety guidelines. Given the uniqueness of APS—the company has a diverse geographical and environmental footprint and a distinctive resource mix—it is ideally suited to help the Administration understand the potential utility applications for sUAS.

Arizona Public Service Company proposes to use sUAS that are rotorcraft, weigh 15 or fewer pounds, operate at a speed of no more than 50 knots, and contain built-in safety features. In addition, Arizona Public Service Company proposes to use the aircraft at low altitudes, not in proximity to airports or densely populated areas, on property that is owned or controlled by Arizona Public Service Company or is a utility right of way or easement, within the visual line of sight of the operator, and under controlled conditions. Accordingly, the requested exemptions satisfy the applicable statutory criteria and policies, will serve the public interest, will not adversely affect safety, and will provide a level of safety at least equal to the existing airworthiness and related regulations. Approval of this Petition is therefore consistent with Section 333's directive to "establish requirements for the safe operation of [unmanned aircraft systems] in the national airspace system" if the Secretary of Transportation determines that certain unmanned aircraft systems may operate safely in the national airspace system.[2]

[2] Section 333(c) of the FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95, 126 Stat 11.

II. APS BACKGROUND

Arizona Public Service Company is an Arizona based utility that services about 1.3 million customers. We maintain more than 44,000 miles of power lines ranging from distribution lines to transmission lines with voltages over 500kv. We also operate and maintain 416 substations in Arizona and multiple generation sites. Arizona Public Service Company is committed, first and foremost to safety. Arizona Public Service Company is focused on the reliability of its system through maintenance and inspection of the existing electrical system as well as build-out of additional facilities. Consistent with Arizona Public Service Company' efforts for providing safe and reliable service to our customers, Arizona Public Service Company seeks to use sUAS to more safely and effectively perform inspections of the electrical infrastructure and solar generation fields.

III. RELEVANT STATUTORY AUTHORITY

A. Section 333

Section 333(a) states that the Administration "shall determine if certain unmanned aircraft system before completion of the plan and rulemaking [to broadly integrate UAS into the national airspace] required by Section 332 of this Act." Section 333 is also described as a pathway for "expedited operational authorization."[3]

Section 333(b)(1) outlines the factors that the Administration shall use to determine whether UAS may be operated safely in the national airspace system: size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight. In addition, and importantly for this Petition, Section 333(b)(2) provides the Administration with the discretion To determine that a certificate of waiver, certificate of authorization, or airworthiness certification is not required to operate UAS that are found to be appropriate under Section 333(b)(1). Finally, Section 333(c) allows the Administration to establish requirements for safe operation of the UAS determined to be able to be operated safely in the national airspace system.

B. Section 44701(f)

In addition to its specific authority related to authorizing UAS operation under Section 333, the Administration has general authority to grant exemptions from its safety requirements and minimum standards if the Administration finds that the exemption is in the public interest. Administration regulations set forth the information that must be included in the petition for exemption: (1) the APS's name and mailing address; (2) the regulations from which the APS seeks exemption; (3) the extent of relief sought and why; (4) the reasons why granting the request would be in the public interest and how it would benefit the public as a whole; and (5) the reasons why granting the exemption would not adversely affect safety, or how the exemption would provide a level of safety at least equal to the rule from which the APS seeks exemption.

IV. DISCUSSION

A. APS's Proposal Satisfies the Section 333 Criteria for Approval.

As described above, Section 333(b)(1) outlines the factors that the Administration shall use to determine whether UAS may be operated safely in the national airspace system: size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight. Applying the criteria outlined in Section 333(b)(1) and other relevant criteria to this case demonstrates that APS's proposed terms and conditions of operation will result in the sUAS being operated safely in the national airspace system, consistent with Section 333. Based on the small size of the sUAS involved, the low altitude and restricted environment in which they will operate, and the fact that they will be operated within the visual line of sight of the operator, there is more than sufficient basis to find that the sUAS can be operated safely under this proposal.

1. Size, Weight, Speed, and Operational Capability

APS proposes to use small, (VTOL) multi-rotor craft with a maximum weight of 7 pounds or less, that are powered by electric batteries and carry no flammable fuel or cargo. Arizona Public Service

Company will use small craft typically referred to as quadcopters with a maximum takeoff weight of 10 pounds including the payload options when situations require specialized equipment, such as infrared cameras for thermal inspection of power equipment are needed.

The sUAS used by Arizona Public Service Company will have integrated GPS autopilot systems. The integrated GPS autopilots provide stable, precise flight, and stable hovering and GPS hold—enabling field workers to focus on situational awareness (*e.g.,* proximity to high voltage equipment) and safety of themselves and the public. In addition, the GPS autopilot system provides an automatic return to home capability in the unlikely case of signal loss with the operator and preprogramed route function for safe return. Additional safety feature include, a base station that constantly provides real-time feedback on the operational effectiveness of the battery, rotors, signal strength, telemetry data and a "black box" that will continually capture operational data during the flight.

These small, multi-rotor craft are ideally suited for inspection of power lines, generating plants and other power-related infrastructure because they often deliver high-quality photo and video more efficiently and cost effectively than traditional methods. Using sUAS can also be safer for utility workers because it will avoid putting utility workers in close proximity to high-voltage equipment and work conditions with high elevations, eliminating the risk of injuries from falls and electrocutions. They also allow the safe inspection of hard-to-access or environmentally sensitive areas without the use of bucket trucks and other utility vehicles. Overall, sUAS can provide significant benefits over traditional energy infrastructure inspection methods to utility workers and customers.

2. Proximity to Airports/Populated Areas

APS will avoid operating the sUAS over densely populated areas and will operate at least three nautical miles away from the nearest public use airport. The sUAS will be operated at low altitudes of 250 feet or less—much lower than the airspace in which manned vehicles operate and lower than the

altitude at which hobby aircraft fly. Finally, all operations will occur over utility property or utility right of way or easements.

In addition, Arizona Public Service Company's flights will likely occur in airspace that is subject to a Notice to Airmen ("NOTAM"). The Administration has issued a standing notice to pilots to avoid loitering in the "airspace above, or in proximity to, sites such as nuclear power plants, power plants, dams, refineries, industrial complexes, military facilities, and other similar facilities." This NOTAM should further limit the potential interaction of any flights near Arizona Public Service Company power transmission facilities.

3. Visual Line of Sight

A pilot (operator) with proper training will have passed an aeronautical test and obtain an UAS operator pilot certificate. The operator will only operate the sUAS during daylight hours, in good weather, and within the operator's line of sight. In addition, the operator will be accompanied by a trained spotter, who also will be positioned in line of sight of the aircraft and will be in constant communication with the operator to identify and alert the operator to any potential obstacles. This eliminates the need for other "sense and avoid" capabilities during operation, as well as the need for any method of air traffic control communications.[6]

[6] *See Interim Operational Approval Guidance 08-01, Unmanned Aircraft Systems Operations in the U.S. National Airspace System* at 4 (Mar. 13, 2008).

B. APS's Proposal Also Satisfies the Standard for Exemption under Section 44701 and 14 C.F.R. § 11.81.

1. Granting APS's Request Would Not Adversely Affect Safety and Would Provide a Level of Safety at Least Equal to Existing Rules.

Granting Arizona Public Service Company' Petition will not adversely affect safety. APS's proposed terms and conditions of operation would provide a level of safety at least equal to existing rules. As discussed above with respect to Section 333(b)(1) criteria, the size, weight, speed, and operational capability of the sUAS that will be used in the proposed operations indicate that the aircraft

can be operated safely in the national airspace system. Moreover, the aircraft will be operated at low altitudes, not in proximity to airports or densely populated areas, and within the visual line of sight of the operator and spotter. In addition, Arizona Public Service Company proposes the following conditions to ensure that the requested exemption would result in a level of safety at least equal to the rules from which Arizona Public Service Company is seeking an exemption.

a. Safety Systems: APS will use sUAS that has a semi-autonomous navigation and control system comprised of a Ground Control Station and "auto-pilot" system. Automated safety functions and safety enhancing features of the sUAS that Arizona Public Service Company will use include the following:

- **Precision Flight and Stable Hovering**: Integrated GPS autopilot system provides position holding, altitude lock, and stable hovering to all field personnel to focus on situational awareness and safely getting the job done.

- **Auto Return-To-Home**: Fail-safe feature will automatically activate in case of signal loss with ground station, using GPS-Enabled autopilot to automatically follow a predetermined safe route of return and landing the craft at the original take-off point.

- **Clearly Visible Battery and GPS Status**: Battery and GPS Status will be available on the receiver and available through the ground station display. Automatic return to home at a set battery level, APS proposes 20%

- **Longest Battery Life in Class:** The sUAS APS will utilize has 88 minutes of possible flight time. APS will not operate with less than 20% battery life or no longer than 60 minutes during a continuous flight, whichever comes first.

- **No Waypoint Zones:** The Ground Control Station features a function called "No Waypoint Zones." This feature provides an extra element of safety around major airports by not allowing the sUAS to operate within a predetermined radius of these airports.

- **Virtual Fence Option:** This feature exists to make sure your SUAS doesn't operate in a undented area, such over a road or other structure.

b. Mandatory Operating Conditions

In addition to the safety features described above, Arizona Public Service Company proposes that its exemption be subject to the following mandatory conditions to ensure safe operation:

- Operations will avoid densely populated areas and only operate over APS property, rights of way or easements.

- Operations will not be conducted over highways, freeways or major roads where traffic is not being controlled.

- Maximum total flight time for each flight will be 60 minutes. Flights will be terminated at 20% battery power reserve, should that occur before this time limit.

- Operations will occur during Visual Flight Rules Meteorological Conditions.

- Aircraft to remain within Visual Line of Sight ("VLOS"). VLOS will be guaranteed with a cylinder of operation around operator of 1/4 nautical miles.

- Operations will occur during daylight hours.

- Flights will be operated at an altitude of no more than 250 feet Above Ground Level("AGL").

- All operations to remain more than three nautical miles from the airport reference point of public use airports.

- Operators and spotters will meet the operator training and certification requirements proposed below.

- Operators and spotters will be in communication at all times.

- Operator will perform required maintenance per the manufacturer's recommendations and keep a log of any maintenance performed.

- Operator will perform any safety checks specified in the manufacturer's user guide prior to each flight.

c. Operator Training and Certification

As discussed above, the sUAS Arizona Public Service Company will use are characterized by a high degree of control and built-in technical capabilities that limit the potential for operation outside the operating conditions set forth in this Petition. Moreover, the mandatory operating conditions (maximum altitude, proximity to airfields, visual line of sight) minimize any potential weather impact and interactions with other aircraft.

Situational awareness around high-voltage equipment, a thorough working knowledge of the sUAS, and strict adherence to corporate sUAS flight policy are key to safe sUAS operations. Given the significant differences between sUAS and piloted aircraft, the safety features inherent in the sUAS, and

the strict operating conditions that will apply. Arizona Public Service Company proposes that, in addition to holding a UAS pilot certificate from an accredited training facility and completed the FAA aeronautical test, operators of the sUAS shall also be required to have:

- Proven knowledge of Arizona Public Service Company UAS flight policy (including Mandatory Operating Conditions specified in this Petition)
- Proven working knowledge of safe sUAS operations, flight characteristics, safety features, GPS/Battery Status indicators, and emergency procedures
- Utility knowledge regarding safe operations around high voltage power lines, substation equipment, and power plants; and
- A valid driver's license.

APS is receptive to future regulations and industry guidance on licensing sUAS pilots using training and testing that is relevant to operating sUAS in a limited flight area.

d. Privacy Considerations

APS will not operate sUAS in any way that may invade personal privacy and will comply with any federal, state, or local privacy laws that may apply in areas where Arizona Public Service Company operates sUAS. In addition, as a practical matter, flights will occur over utility property or utility right of way, so privacy is unlikely to be a concern in relation to APS's proposed use.

2. Granting APS's Request Would Be in the Public Interest and Would Benefit the Public as a Whole.

Allowing the requested use will provide significant benefits to the public, Arizona Public Service Company customers, and Arizona Public Service Company employees. Using sUAS to inspect energy infrastructure can be safer and more efficient than traditional methods of infrastructure inspection, such as the use of helicopters, bucket trucks and climbing inspections. The increased safety and efficiency of using sUAS to inspect infrastructure following significant weather events is especially important to Arizona Public Service Company, which serves 1.3 million customers in Arizona, where storms occur with frequency during the Monson season. An infrastructure inspection process that is safer and more

efficient can help to lower operations and maintenance costs and more quickly resolve problems in the delivery of electricity, both of which will benefit customers.

Moreover, the requested use presents a compelling case for the Administration moving forward with efforts to integrate sUAS into the national airspace system as required by Section 333. The public has a significant interest in efficient and safe inspection of energy infrastructure to ensure reliable delivery of power, and Arizona Public Service Company has proposed using sUAS to further this public interest in a way that is at least as safe as operation of aircraft under existing regulations. APS's request, therefore, provides the Administration an appropriate vehicle to further Congress' mandate to expedite integration of UAS. In addition, APS's operational experience resulting from the use of sUAS in utility operations may be valuable to the Administration in developing comprehensive rules governing sUAS for the electric industry.

C. Description of Relief Sought and Regulations from Which Exemption is Requested

Based on the foregoing, APS's proposal satisfies the criteria for approval under Section 333. In addition, APS's proposal meets the requirements and policies for exemptions from Administration regulations. Arizona Public Service Company therefore respectfully requests that the Administration grant exemptions from the regulations set forth in Appendix A to this Petition.

V. CONCLUSION

For the reasons discussed above, Arizona Public Service Company satisfies the relevant criteria for approval under Section 333 and exemptions from referenced regulations pursuant to Section 44701(f). APS has attempted to identify the applicable regulations for which an exemption is required for the proposed use. To the extent that the Administration determines that any other safety

regulations might apply to APS's proposed use, APS further requests that this Petition be deemed to seek an exemption from those requirements.

Accordingly, Arizona Public Service Company respectfully requests that the Administration grant the relief requested in this Petition to allow the use of sUAS for the purposes and under the conditions set forth herein. Granting this Petition will not only further Congress' instruction to expedite the safe integration of UAS into the national airspace system, but will also further the significant public interest in the safe and reliable delivery of electricity to customers.

February, 24, 2015

Respectfully submitted,

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Appendix A: Regulations from Which Exemption is Requested

APS has attempted to identify the applicable regulations for which an exemption is required for the proposed use. To the extent that the Administration determines that any other safety regulations might apply to APS's proposed use, Arizona Public Service Company further requests that this Petition be deemed to seek an exemption from those requirements.

1. 14 C.F.R. Part 21: Airworthiness Certification

Part 21 establishes procedural requirements for certifications under Section 44704, including airworthiness certificates. Both Sections 333 and 44701(b) authorize the Administration to exempt aircraft from airworthiness certification under this Part based upon consideration of its size, weight, speed, operational capability, and proximity to airports and populated areas. *See* Section 333.

An analysis of these criteria demonstrates that the sUAS operated without an airworthiness certificate, in the restricted environment, and under the conditions proposed will be at least as safe, or safer, than a conventional aircraft operating with an airworthiness certificate without the restrictions and conditions proposed.

The sUAS Arizona Public Service Company will use are 15 pounds or less, carry no pilot or passengers, and carry no explosive materials or flammable liquid fuels. Operations under this exemption will be tightly controlled and monitored by the operator and spotter. These safety enhancements provide at least the same degree of safety to the public and property owners than conventional operations conducted with airworthiness certificates.

2. 14 C.F.R. Part 27: Airworthiness Standards for Normal Category Rotorcraft

Part 27 sets forth the procedural requirements for airworthiness certification of normal category rotorcraft. To the extent the sUAS would otherwise require certification under Part 27, as a rotorcraft, Arizona Public Service Company requests an exemption from Part 27's airworthiness standards for the same reasons identified above with respect to Part 21 requirements.

3. 14 C.F.R. § 45.23(b): Marking Requirements

Section 45.23(b) requires that on limited, restricted, or light-sport category aircraft, or experimental or provisionally certificated aircraft, markings indicating the aircraft category must be displayed in letters not less than two inches nor more than six inches high "near each entrance to the cabin, cockpit, or pilot station." Exemption from 14 C.F.R. § 45.23(b) is warranted because the aircraft has no entrance to the cabin, cockpit, or pilot station on which the required marking can be displayed. Arizona Public Service Company requests an exemption to 14 C.F.R. § 45.23(b)'s marking requirements and proposes instead to display markings to the fullest extent possible in compliance with the location requirements of 14 C.F.R. § 45.27(a) and the size requirements of 14 C.F.R. § 45.29(f).

4. 14 C.F.R. §§ 61.113(a) and (b); 61.133(a): Private Pilot Privileges and Limitations: Pilot in Command; Commercial Pilot Privileges and Limitations

Sections 61.113(a) and (b) limit private pilots to non-commercial operations. 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. Unlike a conventional aircraft that carries a pilot, passengers, and cargo, the sUAS proposed for use by Arizona Public Service Company are remotely controlled with no passengers or cargo on board.

APS respectfully requests exemptions from these requirements based on the particular characteristics of the sUAS that will be used. The risks associated with the operation of the sUAS described above (given the size, speed, operational capabilities, and lack of combustible fuel) are much lower than the risks associated with private pilot operations or commercial operations contemplated by Part 61 with conventional aircraft. Given the inherently lower-risk nature of the sUAS and these safety features, Arizona Public Service Company proposes that operators be required to successfully complete the training described above. This training and the conditions and restrictions on operation proposed in

this Petition will provide an equivalent level of safety as requiring operators to have a private pilot's certificate or a commercial pilot's certificate.

5. 14 C.F.R. § 91.7(a): Civil Aircraft Worthiness

Section 91.7(a) requires that no person may operate a civil aircraft unless it is in airworthy condition. If the Administration grants APS's request for exemption from the requirement to obtain an airworthiness certificate, no Administration regulatory standard will exist for determining airworthiness. Arizona Public Service Company will, however, maintain the sUAS as directed by the manufacturers and conduct any recommended safety checks prior to each flight.

6. 14 C.F.R. § 91.9(b)(2): Civil Aircraft Flight Manual in the Aircraft

Section 91.9(b)(2) prohibits a person from operating a civil aircraft "[f]or 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 sUAS Arizona Public Service Company will use, it is not possible to carry such a flight manual on the aircraft. The equivalent level of safety will be achieved by keeping the flight manual (specifically, the manufacturer's user guide) at the ground control point where the operator will have immediate access to it.

7. 14 C.F.R. § 91.103: Preflight Action

Section 91.103 requires a pilot in command to become familiar with specific information before each flight, including information contained in the Administration-approved Flight Manual on board the aircraft. As no Administration-approved Flight Manual will be provided, Arizona Public Service Company requests an exemption from this requirement. The operator would, however, become familiar with the manufacturer's user guide.

8. 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 sUAS Arizona Public Service Company will use are remotely-piloted aircraft and designed without fully functioning dual controls. Flight control is accomplished through the use of a control box that communicates with the aircraft via radio communications. The equivalent level of safety provided by the fact that neither a pilot nor passengers will be carried in the aircraft, by the size and speed of the aircraft, and the safety features of the aircraft that limit the potential for operation outside the operating conditions set forth in this Petition.

9. 14 C.F.R. § 91.119: Minimum Safe Altitudes

Section 91.119(c) prescribes the minimum safe altitudes under which aircraft may not operate, including 500 feet above the surface and away from any person, vessel, vehicle, or structure in non-congested areas. Section 91.119(d)(1) allows for a helicopter to operate at less than those minimum altitudes under certain conditions.

As described above, Arizona Public Service Company will operate the sUAS at altitudes up to 250 feet AGL, and therefore requests an exemption from the 500-foot minimum altitude. Given the size, weight, and speed of the sUAS and the lack of flammable fuel, any risk associated with these operations is far less than those presently presented with conventional aircraft operating at or below 500 AGL. In addition, the low-altitude operations of the sUAS will ensure separation between these sUAS operations and the operations of conventional aircraft that must generally operate above 500 feet.

10. 14 C.F.R. § 91.121: Altimeter Settings

Section 121 requires each person operating an aircraft to maintain cruising altitude by reference to an altimeter that is set "to the elevation of the departure airport or an appropriate altimeter setting available before departure." As the sUAS may not have a barometric altimeter, but instead use GPS technology, Arizona Public Service Company requests an exemption from this requirement to the extent it operates sUAS without a barometric altimeter. An equivalent level of safety will be achieved by the operator confirming the acquisition of GPS signals and an initial ground level altitude of zero prior to take off.

11. 14 C.F.R. § 91.151(a): Fuel Requirements for Flight in VFR Conditions

Section 91.151(a) prohibits an individual from beginning "a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing, and, assuming normal cruising speed – (1) During the day, to fly after that for at least 30 minutes; or (2) At night, to fly after that for at least 45 minutes."

APS requests an exemption from the 30 minutes of reserve fuel requirement. Given the limitations on flight locations and operations set forth in this Petition, a longer time frame for flight is reasonable. Operating the sUAS in a tightly controlled area with less than 30 minutes of reserve fuel does not engender the type of risks that Section 91.151(a) was intended to alleviate given the size and speed of the sUAS.

APS proposes that an equivalent level of safety can be achieved by limiting flights to 60 minutes or 20% of battery power, whichever happens first. This restriction would be more than adequate to return the sUAS to its planned landing zone from anywhere in its limited operating area.

12. 14 C.F.R. § 91.203(a) and (b): Carrying Civil Aircraft Certification and Registration

Section 91.203 requires a civil aircraft to have "within it . . . [a]n appropriate and current airworthiness certificate" that must be "displayed at the cabin or cockpit entrance so that it is legible to passengers or crew." As discussed above with respect to Section 91.9(b)(2) requiring the aircraft to carry a flight manual, the physical characteristics of sUAS are such that there is no ability or place to carry

registration documents or to display them on the sUAS. An equivalent level of safety will be achieved by keeping registration documents at the ground control point where the operator will have immediate access to them. Moreover, the requirement to carry airworthiness certificate will not apply to Arizona Public Service Company if the Administration grants APS's request for an exemption from this requirement, as requested above.

13. 14 C.F.R. §§ 91.405(a); 91.407(a)(1); 91.409(a)(2); 91.417(a) and (b): Maintenance Inspections

These regulations specify maintenance and inspection standards in reference to 14 C.F.R. Part 43. Specifically, 14 C.F.R. § 91.405(a) states that the owner or operator of an aircraft shall have the aircraft inspected as prescribed in the rules and have discrepancies repaired as prescribed in part 43; 14 C.F.R. §§ 407(a)(1) and 409(a)(2) requires that an aircraft be approved for return to service by a person authorized under 14 C.F.R. Section 43.7 after it has undergone maintenance or receives an annual inspection; and 14 C.F.R. § 417 requires an owner or operator of an aircraft to maintain specific types of maintenance records, including signatures of the person authorized to approve the aircraft's return to service.

Given that these sections and Part 43 apply only to aircraft with an airworthiness certificate, these sections will not apply to APS's operation of sUAS. Maintenance will be accomplished by the operator pursuant to the manufacturer specifications. An equivalent level of safety to existing regulations will be achieved because these sUAS are very limited in size, operate only in restricted areas for limited periods of time, and carry no flammable fuel. If mechanical issues arise, the sUAS can land immediately and will be operating from no higher than 250 feet AGL. As described above, the operator will ensure that the sUAS is in working order prior to initiating flight, perform a preflight safety checklist, perform required maintenance, and keep a log of any maintenance performed. Moreover, the operator is the

person most familiar with the aircraft and best suited to maintain the aircraft in an airworthy condition to provide the equivalent level of safety.

14. 14 C.F.R. § 91.1501: Continued Airworthiness

Section 91.1501(a) "requires operators to support the continued airworthiness of each airplane." Arizona Public Service Company requests an exemption from this regulation because the sUAS will not be subject to an airworthiness certificate.

Appendix B: Summary Suitable for Publication in the Federal Register

APS petitions the Federal Aviation Administration for relief from compliance with 14 C.F.R. Part 21;14 C.F.R. Part 27; 14 C.F.R. §§ 45.23(b); 61.113 (a) and (b); 61.133(a); 91.7(a); 91.9(b)(2); 91.103; 91.109; 91.119; 91.121; 91.151(a); 91.203(a) and (b); 91.319(a)(1); 91.405(a); 91.407(a)(1); 91.409 (a)(2); 91.417 (a) and (b); 91.1501 for purposes of operating small unmanned aircraft 15 pounds or less on property that is owned or controlled by Arizona Public Service Company or in utility right of way to inspect energy infrastructure and identify problems in the delivery of electricity to customers. Arizona Public Service Company proposes that its operation be subject to the operating conditions and safety standards set forth in the petition in lieu of the above-referenced regulations in order to provide a level of safety equivalent to those regulations.

From: Ian.Hatfield@aps.com
To: 9-AWA-AVS-333Exemptions (FAA)
Cc: Cooper, Thuy (FAA)
Subject: RE: Arizona Public Service Company (FAA-2015-0488) - Request for Information
Date: Tuesday, July 14, 2015 4:38:04 PM

As per the conversation with Ms. Cooper I am writing to inform you the information requested was submitted on June 25th. The contents of the comment can be found below as well.

Thanks again for all your help.

The requested information is stated below:

The make and model of this aircraft is a "Microdrone, MD4-1000", which is one of the most widely used aircraft in the world for inspection purposes. The type of aircraft is classified as a "Multi-rotorcraft" or "Rotorcraft'. The aircraft itself weighs 5.84 pounds (depending on setup) and has a maximum payload weight of an additional 2.65 pounds which would be 8.49 pounds in total during operation. The maximum stated takeoff weight (MTOW) is 13.23 pounds.

Additional information about the specific UAS. This aircraft is also unique as it has been designed and lab tested to withstand high voltage interference up to 380kv making it one of the safest UAS in the global market for the purpose of electrical utility inspections. It also has the longest possible battery life (88 Minutes) for an added level of safety during operation. The Base station with MdCockpit has the ability to view the current health of the aircrafts systems, batteries, motor operation and temperature, signal strength of two controllers at different frequencies and GPS. Virtual fence and roof options make sure the aircraft stays with-in range and away from people, other aircraft and buildings. A pre-programmable return route or return to home feature in case of loss of signal that can be adjusted for obstacles and differing heights.

From: Hatfield, Ian R
Sent: Thursday, June 25, 2015 11:24 AM
To: 'Thuy.Cooper@faa.gov'
Subject: RE: Arizona Public Service Company (FAA-2015-0488) - Request for Information

Ms. Cooper,

Thank you so much, I have included the requested information in the docket in the comments section.

Have a great day,

Ian

From: Thuy.Cooper@faa.gov [mailto:Thuy.Cooper@faa.gov]
Sent: Wednesday, June 24, 2015 8:55 AM
To: Hatfield, Ian R
Cc: 9-AWA-AVS-333Exemptions@faa.gov
Subject: Arizona Public Service Company (FAA-2015-0488) - Request for Information

June 24, 2015

Dear Mr. Hatfield:

This letter is to inform you that the following information is missing from your petition (Docket No. FAA-2015-0488). This information is necessary for the Federal Aviation Administration (FAA) to process your petition.

- Describe the aircraft make(s), model(s), and type(s)(i.e. - fixed-wing, rotorcraft, lighter-than-air) for the proposed UAS operation. The description(s) should include the maximum weight (including payload). This information can be located in the aircraft manual(s).

Please submit the additional information (non-proprietary) to your docket at www.regulations.gov. Any additional confidential/proprietary materials can be e-mailed separately to 333exemptions@faa.gov. If you do send in supplemental documents separately, please add a comment on the docket, indicating that you submitted supplemental information separately. We will upload a copy of this email in your docket.

If you want us to process your request any further, we must receive the information described above by July 8, 2015. If we do not receive the information, we will close the docket without notifying you further.

Regards,

Ms. Thuy H. Cooper
Senior Rulemaking Analyst
Airspace and Airmen Rules Division - ARM 106
Office of Rulemaking
Federal Aviation Administration
Telephone: 202-267-4715
thuy.cooper@faa.gov

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