

# STATEMENT ACCOMPANYING REQUEST TO MODIFY EXPERIMENTAL AUTHORIZATION WG2XVN OF AEROVIRONMENT, INC.

## 1. Introduction

By this application, AeroVironment, Inc. (AeroVironment), requests that the Commission grant a modification to call sign WG2XVN to operate facilities within the 1670-1675 MHz band at 3 additional sites.

We also request that the following sites be deleted from WG2XVN or that we be permitted to file a modification to do so. The sites where experiments are complete and should be deleted are:

- Sites (39/40) NAS Point Mugu, CA-5 km centered on NL 34-07-09; WL 119-07-10,
- Sites (55/56) Boquillas, AZ- 98.16 km centered on NL 35-40-57; WL 112-44-21,
- Sites (59/60) 9000 Paradise Road, Mapes, CA- 2.5 km centered on NL 37-37-40; WL 121-10-22
- Sites (67/68) 5530 Avenue 320, Goshen, CA- 3 km centered on NL 36-22-10; WL 119-27-17.

The proposed new sites, detailed in the attached Form 442 are:

- Wilmington, NC,
- Castaic, CA and
- Oakdale, CA.

These new experiments involve power plant infrastructure, power transmission facilities and agriculture. There are no modifications to the technical elements of the technology. In this statement, we explain the purpose of the modification and why this application is within the Commission's experimental authorization rules.

A fourth site, located in Arecibo, PR, is located near the Arecibo National Observatory. We are coordinating with the Spectrum Manager at the Observatory and will submit an application for this site upon completion of the coordination.

## 2. Purpose

### *Background*

The purpose of these experiments is providing analysis and information to further aerial surveillance in support of the operational aspects of the power industry infrastructure and agriculture. The ability of real-time full motion video via small unmanned aircraft system (SUAS) technologies to assist in monitoring on a regular basis contributes to better supervision, cost efficiencies and improved maintenance. Real time information and imagery allows more informed assessment and faster corrective action. Data captured by cameras is typically far more

accurate than the human eye and provides lengthier opportunity to scrutinize the challenge. For nighttime operations, a SUAS can be fitted with an infrared (IR) camera to enhance visibility.

The aerial monitoring and inspections proposed for the power grid facilities seeks to show that the technology can make a meaningful contribution in monitoring and maintaining these facilities. An important element of these experiments is ability of the transmitted video technology to discern variations and changes over short and longer time increments.

These SUAS experiments will pursue efficiencies in farming, including planting, fertilizing and harvesting. The technology seeks to demonstrate how it can assist in a farm adapting to seasons, weather or crop growing cycles.

Each proposed site presents a unique environment to test the radio transmissions directing the command and control and payload features of the SUAS and the quality and detail of the data transmissions from the aircraft. The research and information that results from this work is provided to the Federal Aviation Administration (FAA) and is critical to the FAA's congressionally mandated project to integrate SUAS into civilian airspace.

The experiments at the proposed sites will contribute to the research portfolio surrounding SUAS radio technology. A critical facet of this research is the effectiveness of the SUAS datalink behavior and performance in varied environments while engaging in representative mission sets. The work is an important facet of AeroVironment's investment in a platform of SUAS commercial uses and upon which future investment relies.

The details of sites and purpose are:

- Wilmington, North Carolina- 34 23 54 N/ 78 05 53 W- 18 km radius of operation, 121.92 m AGL. The experiments will engage the SUAS technology at the Duke Energy Sutton Plant.
- Castaic, California- 34 29 46 N/118 41 10 W- 14 km radius of operations, 121.92 m AGL. The experiments will test the technology in surveillance of Southern California Edison transmissions lines.
- Oakdale, California- 37 49 19 N/120 50 29 W- 4 km radius of operations, 121.92 m AGL. The experiments will test the technology at Phippen Farms.

### **3. Technology Use**

The experiments embrace a model using a band segment aligning with technology and equipment currently available. AeroVironment reiterates its commitment to operations respecting other users of the band and those in adjacent segments. The limited power levels proposed are part of this commitment. AeroVironment believes the compelling purpose of bringing these advanced services to the electric utility and railway sectors serves the public interest. The 1670-1675 MHz channels provide SUAS control and video and telemetry transmission from the SUAS to the ground. Slots are dedicated for uplink data and a downlink.

At each individual site, there will be only one SUAS airborne at any time. Operations will be limited to 121.92 meters AGL and below. The SUAS will remain within the radius of the exercise center points, which range from to 2.5 km to 18 km.

#### **4. Nature of Operations**

##### *Surface Based and Airborne Transmission*

As noted in our original application, AeroVironment's communications module, Digital Data Link (DDL), will use the 1670-1675 MHz band segment for purposes of sending ground based command and control data to and from the SUAS and to transmit video and telemetry to the ground control station. The technology, capable of operating within 1625-2390 MHz, requires 4 MHz for full motion video and a 1 MHz channel for video at 15 frames per second. Emission Designators are 4M68G7W and 1M56G7W, respectively, with a transmit power at 10W. Transmission control will be from the surface control station to the SUAS via a laptop or console. AeroVironment's DDL system is the US Army's standard for communications architecture for all small unmanned systems, including ground robots.

#### **5. Stop Buzzer**

Andy Thurling, Chief Test Pilot, Director, Product Safety and Mission Assurance, will be available by telephone at 805.581.2198, extension 1892, Cell Phone 805.368.6351 and will act as a "stop buzzer" if any matters involving interference arise during the testing.

#### **6. Transmitting Equipment**

The transmitting equipment is unchanged. It is AeroVironment Transreceiver Model 50280, with 2 units at each location. It is not experimental.

## 7. Antenna

The Antenna details have not changed from the current authorization and are as follows:

<b>Antenna</b>	<b>Gain (Nominal)</b>	<b>Polarization</b>	<b>Orientation in Vertical Plane</b>	<b>Oriental in Horizontal Plane</b>
GCU Antenna ASY AeroVironment Stack Patch	9dbi*	Vertical	30	85
1670-1675 MHz Tailboom ASSY AeroVironment Dipole	2dbi	Vertical	78	360

\*Major Side Lobe

- E-Plane
  - Gain: -2 dbi
  - 120 deg
- H- Plane
  - Gain: -2 dbi
  - 179 deg

## 8. Restrictions on Operations and Interference Protection

AeroVironment understands that experimental operations must not cause harmful interference to authorized facilities. Should any interference occur, AeroVironment will take immediate steps to resolve the interference, including, if necessary, discontinuing operations.

## 9. Waiver of Station Identification Requirements

AeroVironment requests a waiver of the station identification requirements stated in Section 5.115 of the Commission's rules.

## 10. Federal Aviation Administration (FAA) Certificate of Waiver Authorization (COA)

AeroVironment has or will file applications for a Certificate of Waiver or Authorization with the FAA detailing the areas where the SUAS will be flying during the proposed operations. AeroVironment understands that no operations will be pursued until FAA approval of the COA and that any operations will be within the COA parameters.



## **11. Diagram**

A diagram and referenced maps of the proposed operations are provided in the Attachment.

## **Conclusion**

AeroVironment appreciates very much the Commission's consideration of this modification application for an Experimental Authorization. Please call upon us if we can respond to any questions.

Attachment

# Operations Diagram



Small Unmanned Aircraft-

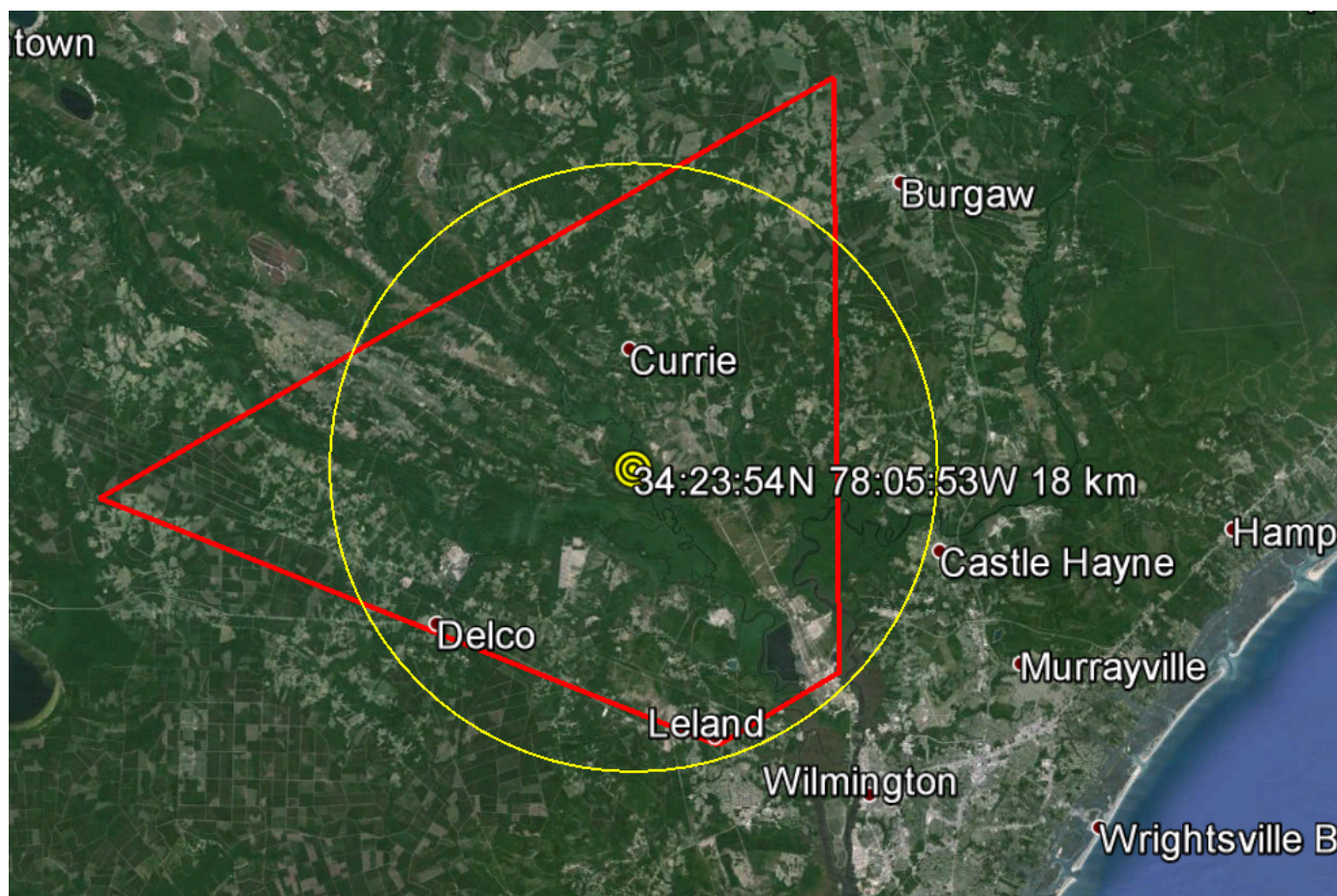
Video and Telemetry  
1670-1675 MHz

Aircraft Command and Control Main and  
1670-1675 MHz

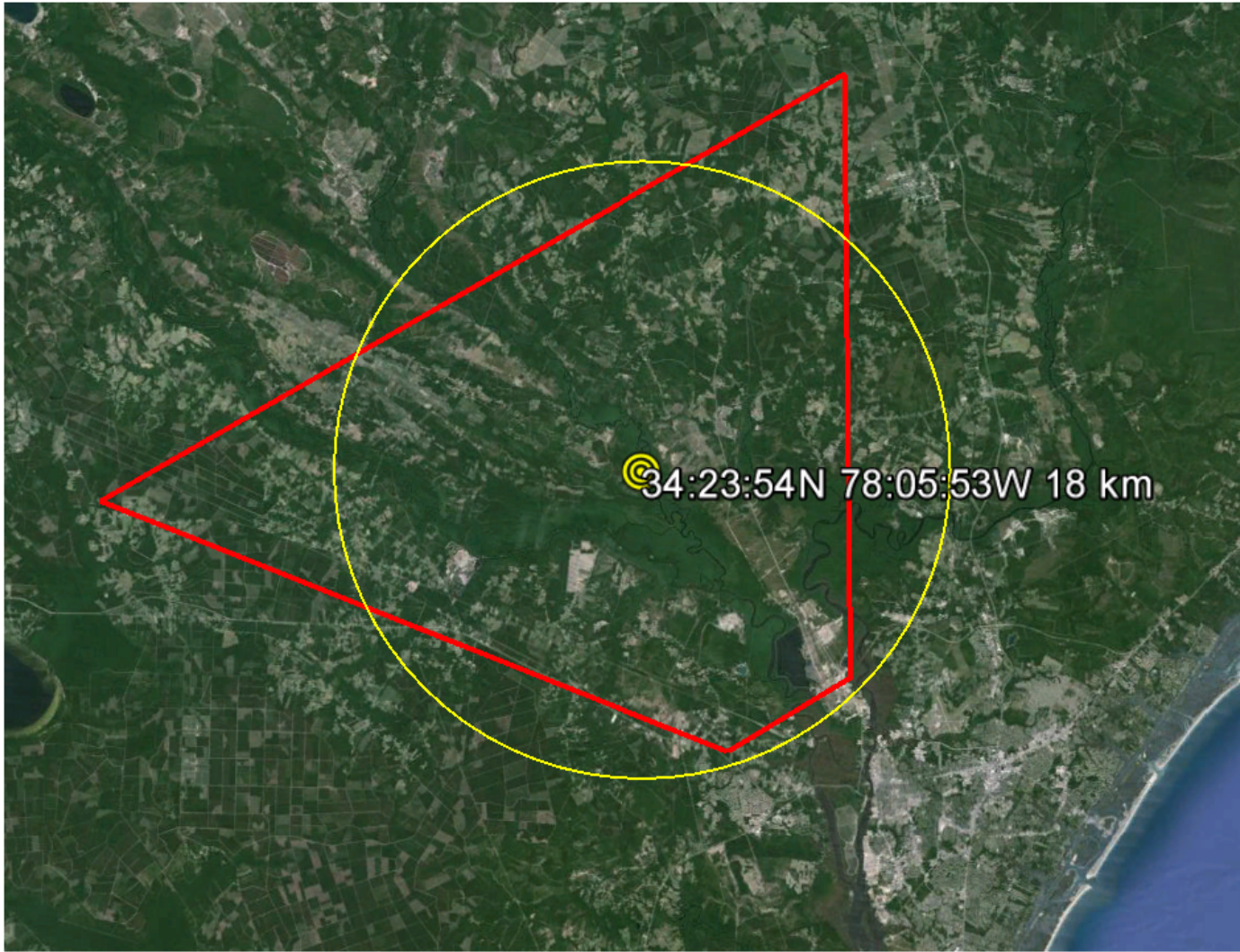


# NC - Wilmington - Duke

Site Name	Wilmington, NC
Latitude	34:23:54 N
Longitude	78:05:53 W
Radius (km)	18 km
Customer	Duke
Justification	
KMZ File	<a href="#">Wilmington NC.kmz</a>







34:23:54N 78:05:53W 18 km

# CA - Castaic - SCE

Site Name	Castaic, CA
Latitude	34:29:46 N
Longitude	118:41:10 W
Radius (km)	14 km
Customer	SCE (Pardee powerlines, Moorpark to Santa Clarita)
Justification	
KMZ File	<a href="#">Castaic.kmz</a>

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# CA - Oakdale - Phippen

Site Name	Oakdale, CA
Latitude	37:49:19 N
Longitude	120:50:29 W
Radius (km)	4 km
Customer	Phippen Farms
Justification	
KMZ File	Oakdale.kmz

