



**LIMITED RADIOFREQUENCY EXPOSURE ASSESSMENT  
PETALUMA CITY SCHOOLS  
200 Douglas Street, Petaluma, CA.**

Prepared For:

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## EXECUTIVE SUMMARY

RESIG (Redwood Empire Schools' Insurance Group) was requested by the Petaluma City Schools District (PCS) to conduct a limited radiofrequency (RF) sampling assessment of Wi-Fi networks in Petaluma City Schools. Mary Collins at Cherry Valley Charter School, McNear School, and Petaluma High School were selected to sample as they represent standard wireless configuration sites in PCS. The assessment began on June 27, 2016 and concluded on July 29, 2016.

Measurements were collected of non-ionizing energy associated with radiofrequency fields propagated by Wi-Fi. The assessments were conducted utilizing an Anaheim Scientific Model 200 3-Axis Radio Frequency Field Strength Meter.

The highest reading obtained was  $0.098 \mu\text{W}/\text{cm}^2$  (6 minutes averaging time) in room C13 at Petaluma High School. This is approximately 10,000 times (4 orders of magnitude) below the Federal Communication Commission's (FCC) Maximum Permissible Exposure of  $1,000 \mu\text{W}/\text{cm}^2$  and below other standardized exposure limits (OSHA, International Commission on Non-ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE)).

Based upon the findings of this assessment, RESIG believes that similar results would be obtained in other classroom environments using similar equipment and Wi-Fi configurations.

Given that the monitoring results were several orders of magnitude below regulatory limits no further school district action is recommended at this time.

## SCOPE OF WORK

The scope of work for this environmental investigation consisted of collecting measurements of non-ionizing energy (radiofrequency) emitted by Wi-Fi and associated with Wi-Fi enabled devices. Radio Frequency emissions were measured in room 10 at McNear School, room L2 at Cherry Valley, and room C13 at Petaluma High School. All tested rooms were equipped with activated wireless access points. Measurements were collected in the center of the rooms, at clusters of Wi-Fi enabled iPad devices downloading and playing video, and directly in front of an iPad playing video. Twenty-nine (29) iPad Minis were utilized to obtain measurements at Cherry Valley and McNear School. Twenty-nine (29) iPad Airs were used at Petaluma High School. All iPad devices were streaming video continuously during both the one-minute and the six-minute monitoring time.

In order to assess the background (ambient) radio frequency emissions in the vicinity of the schools, RF measurements were obtained from each school parking area at each location.

## STANDARD OF CARE

The results, findings, conclusions, and recommendations expressed in this report are based on conditions observed during our investigation. The information contained in this report should not be relied upon to represent conditions that existed prior to or after this investigation. RESIG does not warrant the services of regulatory agencies, laboratories, or other third parties supplying information that may have been used in the preparation of this report.

## RELIANCE

This report may not be relied upon by any other party other than the CLIENT for whom RESIG has conducted this environmental investigation. It is further understood that this report may only be used in its entirety.

## MEASUREMENT PROTOCOLS

Exposures were averaged over a specific time interval. The averaging time for controlled exposures is six minutes as recommended by FCC guidelines, OSHA and the IEEE. Time averaged exposures are of main interest for comparing against exposure limits. Exposures averaged over one minute are also presented in this report. All results are reported as maximum averages.

At the request of the district a six-minute measurement was also obtained from a Motorola Moto X smart phone (second generation) in airplane mode for comparative purposes. The result was 0.003  $\mu\text{W}/\text{cm}^2$ . A second six-minute measurement with the phone downloading and playing a video was 47.05  $\mu\text{W}/\text{cm}^2$ .

### RF EXPOSURE MEASUREMENT RESULTS Mary Collins at Cherry Valley Charter School

LOCATION ROOM L2	1-MINUTE EXPOSURE $\mu\text{W}/\text{cm}^2$	6-MINUTE TIME AVERAGED EXPOSURE $\mu\text{W}/\text{cm}^2$
Parking lot-background reading	0.006	0.017
iPads playing internet video	0.068	0.071
12" in front of iPad playing video	0.062	0.071
Individual iPad- Measurements 5" from antennae w/video playing (29 iPad devices streaming video in classroom)	0.088	0.092
29 iPad devices in "Airplane Mode"	0.024	0.027

**EXPOSURE MEASUREMENT RESULTS  
McNear School**

<b>LOCATION- ROOM 10</b>	<b>1-MINUTE EXPOSURE <math>\mu\text{W}/\text{cm}^2</math></b>	<b>6-MINUTE TIME AVERAGED EXPOSURE <math>\mu\text{W}/\text{cm}^2</math></b>
Parking Lot-background reading	0.053	0.070
iPads playing internet video	0.071	0.088
12" in front of iPad playing video	0.059	0.090
iPad-Measurements 5" from antennae w/video playing (29 iPads streaming video in classroom)	0.089	0.096
29 iPads in "Airplane Mode"	0.039	0.058

**EXPOSURE MEASUREMENT RESULTS  
Petaluma High School**

<b>LOCATION- ROOM C13</b>	<b>1-MINUTE EXPOSURE <math>\mu\text{W}/\text{cm}^2</math></b>	<b>6-MINUTE TIME AVERAGED EXPOSURE <math>\mu\text{W}/\text{cm}^2</math></b>
Parking Lot	0.006	0.010
iPads playing internet video	0.083	0.095
12" in front of iPad playing video	0.089	0.098
iPad-Measurements 5" from antennae w/video playing (29 iPads streaming video in classroom)	0.054	0.075
29 iPads in "Airplane Mode"	0.021	0.027
Hallway Outside C13 and C4	0.017	NA

At the request of the district, RESIG also collected RF measurements from several non-educational locations. All results are maximum averages.

### EXPOSURE MEASUREMENT RESULTS

LOCATION	1-MINUTE EXPOSURE $\mu\text{W}/\text{cm}^2$	6-MINUTE TIME AVERAGED EXPOSURE $\mu\text{W}/\text{cm}^2$
Safeway parking lot- McDowell Blvd., Petaluma	0.162	0.233
Starbucks-Inside-Lakeville Hwy., Petaluma	0.068	0.126
Putnam Park	0.096	0.102
Outside Typical Office Bldg.	0.092	0.101

### RF EXPOSURE LIMITS AND GUIDELINES

ORGANIZATION	EXPOSURE TYPE	$\mu\text{W}/\text{cm}^2$	SOURCE
ANSI	Public	1,000	
ICNIRP	Public	1,000	International Commission on Non- Ionizing Radiation Protection (1998).
	Occupational	5,000	
IEEE	Public	1,000	
OSHA	Occupational	10,000	29 CFR §1910.97
FCC	Public	1,000	
LAUSD	Precautionary	$0.1 \mu\text{W}/\text{cm}^2$	Los Angeles Unified School District
China	Public	10	Foster, K. R. Exposure Limits for Radiofrequency Energy: Three Models. World Health Organization, Conference on Criteria for EMF Standards Harmonization.
Russia	Public	10	
Switzerland	Public	10	
Bioinitiative Report 2007	Cautionary Level	0.1	BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Radiation
Bioinitiative Report 2012	Cautionary Level	0.0003*	

\*The value of  $0.0003 \mu\text{W}/\text{cm}^2$  is below ambient (background) power density regardless of location and is considered to be unattainable.

### RECOMMENDATIONS

Results of the limited RF monitoring assessment were all orders of magnitude below the FCC safety limit and the IEEE and ICNIRP exposure guidelines. All values were also below the LAUSD precautionary limit of  $0.1 \mu\text{W}/\text{cm}^2$ . Based upon the findings of this assessment, RESIG believes that similar results would be obtained in other classroom environments using similar equipment and Wi-Fi configurations.\*

No further action regarding RF exposure in similar classroom environments is recommended at this time.

RESIG appreciates the opportunity to perform these professional services for the Petaluma City Schools. If you have any questions or comments regarding the information in this report please contact RESIG.

\*RF measurements delineated in this report should be considered as a general screening procedure only. Such measurements are not exhaustive. The information contained in this report is provided for informational purposes only. RESIG makes no representation of unique expertise regarding EMF and RF energy specifically. If additional, more detailed information is necessary, RESIG recommends consulting with experts in the field of EMFs, e.g., electronic engineers, physicists, epidemiologists, etc.

## LIMITATIONS

This report is an original work product. This document is confidential and for the exclusive use of the client. This report is protected by the Copyright Act, Section 17 USC, and has been prepared for the sole and exclusive use of the client.

The conclusions, opinions, recommendations and results presented in this report are based solely on the information and data available during the course of the investigation. Factual information provided by the client, owner or their representative regarding the operations, conditions, test data, maintenance and repairs, or historical information were presumed to be accurate and complete. RESIG is not responsible for the accuracy of information provided by others. The conclusions presented are based upon conditions that existed at the time of the assessment.

Additional information that was not readily available, hidden, undiscovered, inaccessible, or are not part of the findings presented herein, may result in the modification of the conclusions and recommendations made herein.

The measurement protocols, techniques and scope of services were not comprehensive and should not be considered all-inclusive.

RESIG's scope of services did not include the assessment, sampling or identification of lead based paint, asbestos containing materials or any other potentially hazardous or controlled substances.

RESIG is not a law firm, and therefore, makes no representations regarding any potential liability of any person or entity for site conditions. RESIG is not qualified to present medical advice. If any past, present or future health issues are in question, it is recommended that the findings of this report be presented to a qualified medical professional for review and evaluation.

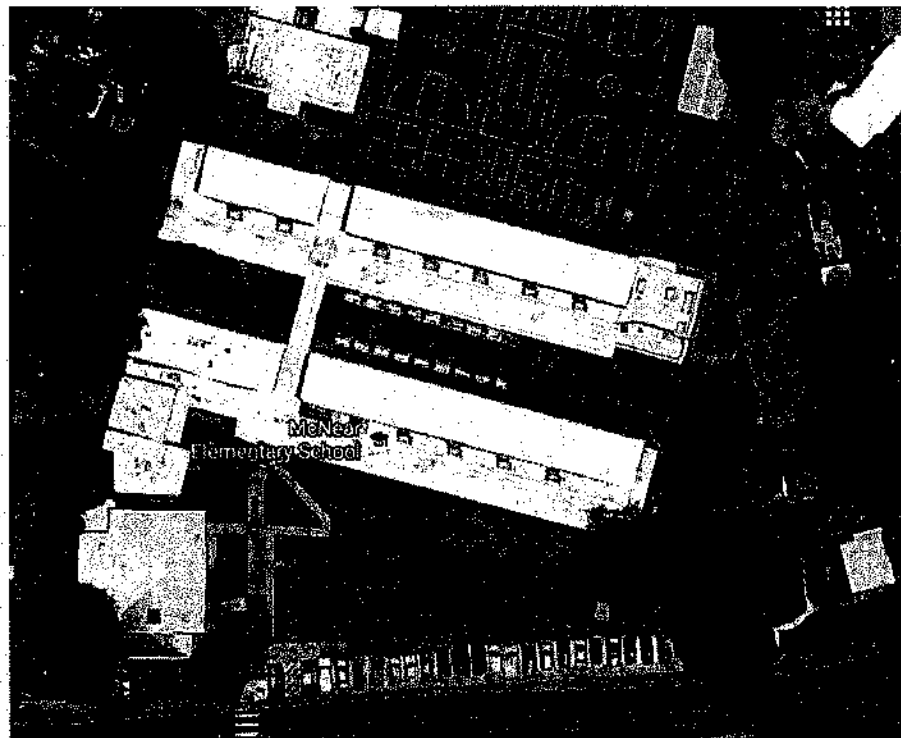
RESIG has conducted an environmental investigation to evaluate specific conditions at the subject property using reasonable and prudent investigative techniques. RESIG assumes no liability or responsibility for claims that may arise out of failure to identify, correct or remediate problems that may exist at the subject property.

## SITE PHOTOGRAPHS





Mary Collins at Cherry Valley Charter School



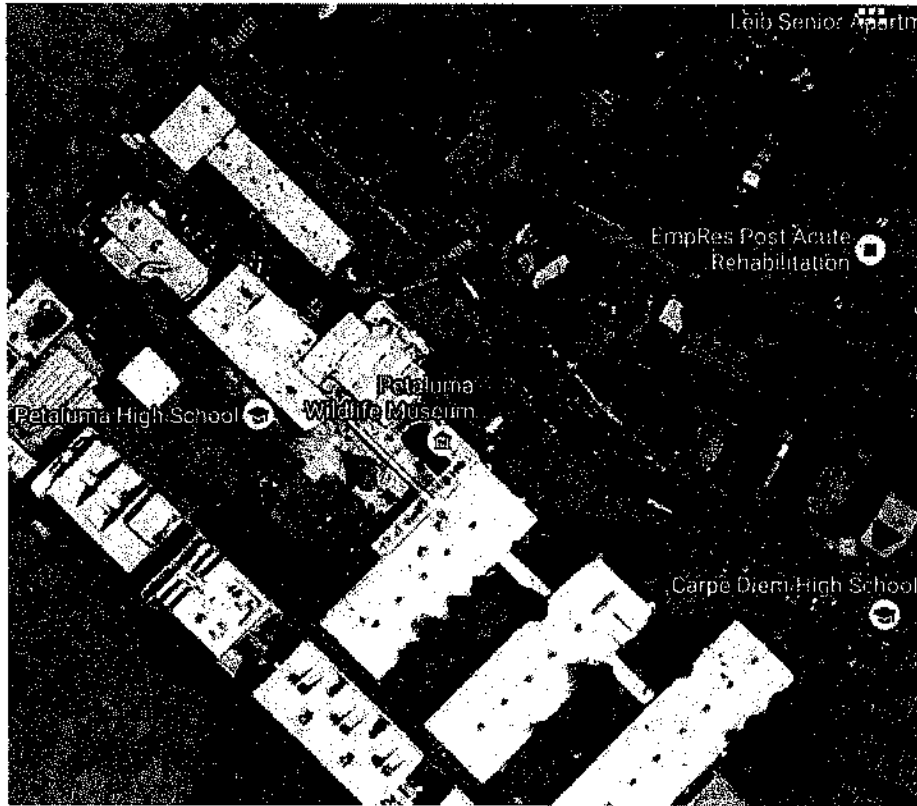
McNear School



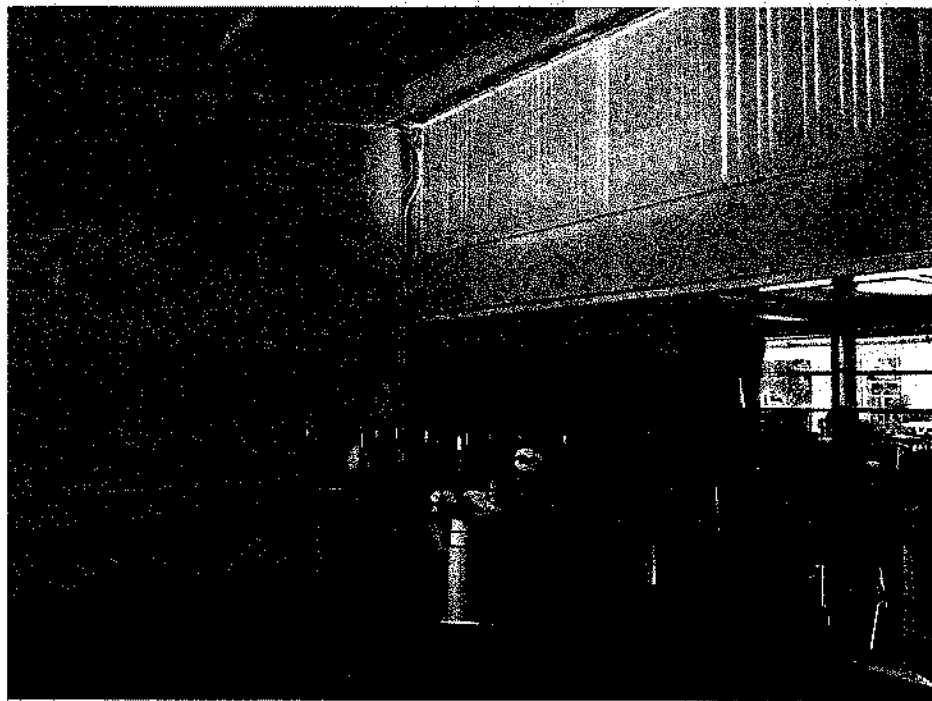
Mary Collins at Cherry Valley Charter School



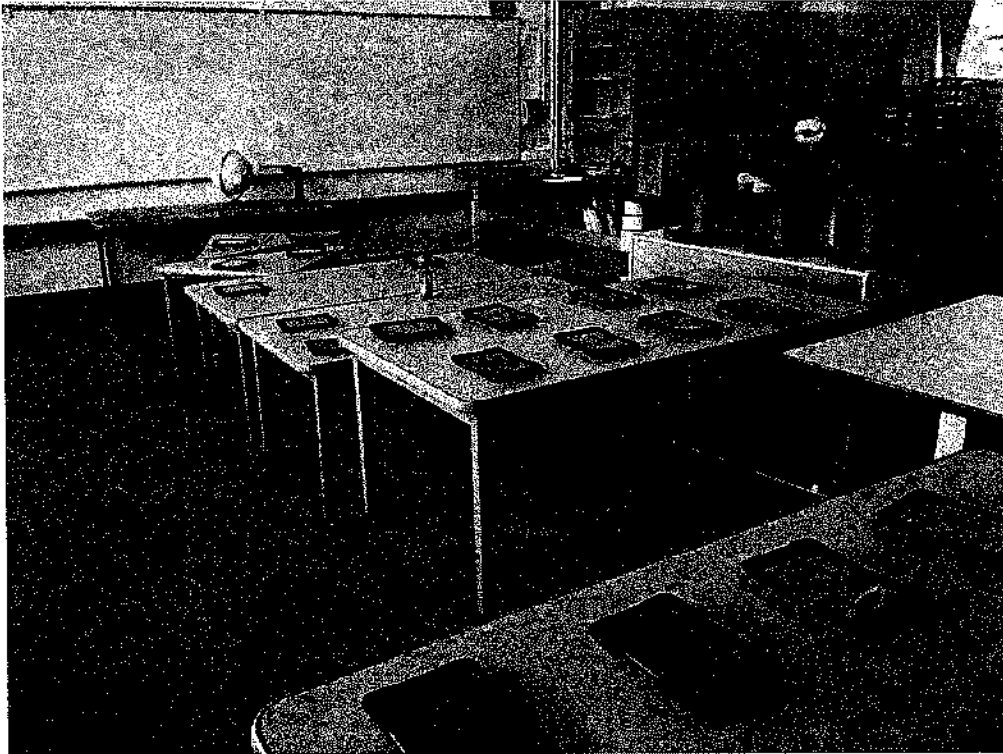
McNear School



Petaluma High School



Access point in room 10 at McNear School



iPad Mini cluster in room 10 at McNear School



Measuring RF emissions from iPad Mini