

Radio Frequency Radiation (RFR) in 2018 in Four Residential Neighborhoods, Davis, California

Electrosmog Awareness Project, Davis, California

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Introduction

We measured radio frequency radiation (RFR) in four residential neighborhoods in Davis. Two of the neighborhoods are in east Davis, and two are in west-central Davis. Three of the four neighborhoods include a cell tower (wireless transmission facility).

Summary of Results—and Some Observations

- We discovered that most of the measured RFR is 3G or 4G cellular signals
- The highest value we recorded was 16,000 microwatts per square meter ($\mu\text{W}/\text{m}^2$)
- The lowest value we recorded was $2 \mu\text{W}/\text{m}^2$
- The intensity of RFR within a few blocks of each cell tower exceeds $1,000 \mu\text{W}/\text{m}^2$
- For comparison: RFR in nature, away from towns and cities, is $0.000001 \mu\text{W}/\text{m}^2$
- "Full signal" (4 or 5 "bars" on a cell phone) can be achieved at $0.01 \mu\text{W}/\text{m}^2$. Thus, wireless signals saturate these neighborhoods over 200x above "full signal".
- Conclusion: no gaps in cellular service exist within the measured neighborhoods

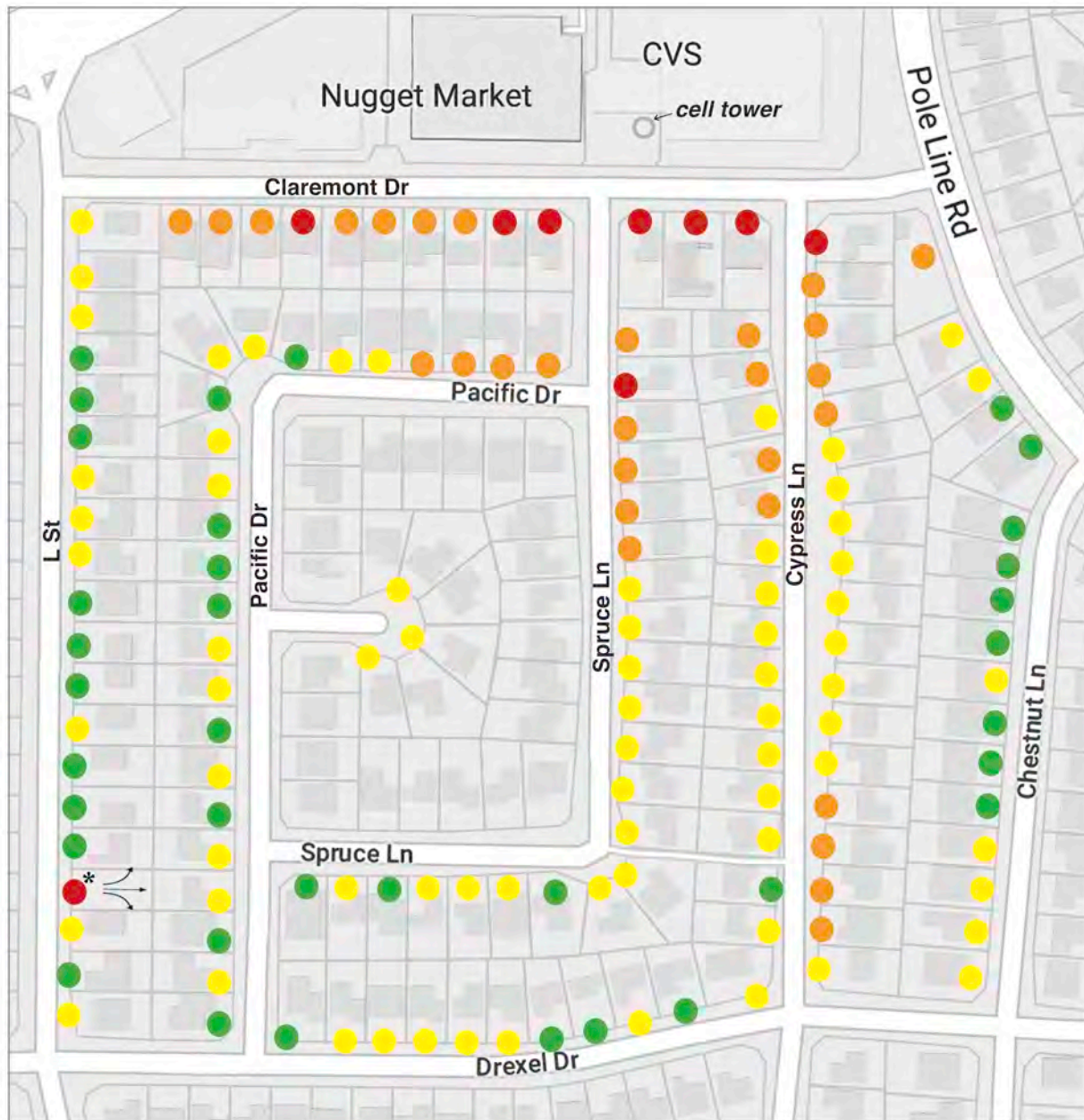
More Observations

- RFR at all sites was within the U.S. Federal Communication Commission's thermal-only safety guideline, which protects against shock or heating due to a short-term (6 to 30 minute) exposure.
- In the U.S., we have no safety guideline for low-intensity (nonthermal) long-term exposure.

Brief Guide Regarding Health Implications

- Epidemiology studies conducted in Germany, Austria, Spain, France, India, Brazil, and several other countries during the past 20 years suggest that neurophysiological effects can occur with long-term exposure (months to years) at RFR intensities as low as $100 \mu\text{W}/\text{m}^2$
- Such effects include fatigue, difficulty sleeping, difficulty concentrating, poor short-term memory, headache, irritability, anxiety, depression, dizziness, nausea, visual problems, heart palpitations, digestive problems, tinnitus (ringing in the ears), and joint pain or other chronic pain.
- Those same studies suggest strongly that neurophysiological ailments are more likely with long-term exposures above $1,000 \mu\text{W}/\text{m}^2$
- Recent animal studies and a few clinical studies link RFR to diabetes and to various neuro-degenerative diseases, including Alzheimer's Disease and Multiple Sclerosis (MS). Some of those studies suggest that patients need exposures at home of less than $10 \mu\text{W}/\text{m}^2$ to get better.

Radio Frequency Radiation Along Sidewalk, Davis, California Claremont Drive to Drexel Drive, April 2018



One-minute samples; frequency range 100 MHz to 8 GHz; data compiled by Larry Rollins, graphics by Pat Suyama
*Empty lot (no house); exposure here to "smart" meters on nearby houses.

KEY: ■ 1.0 to 10.0 $\mu\text{W}/\text{m}^2$ ■ 10.0 to 99.9 $\mu\text{W}/\text{m}^2$ ■ 100 to 999 $\mu\text{W}/\text{m}^2$ ■ $\geq 1,000 \mu\text{W}/\text{m}^2$

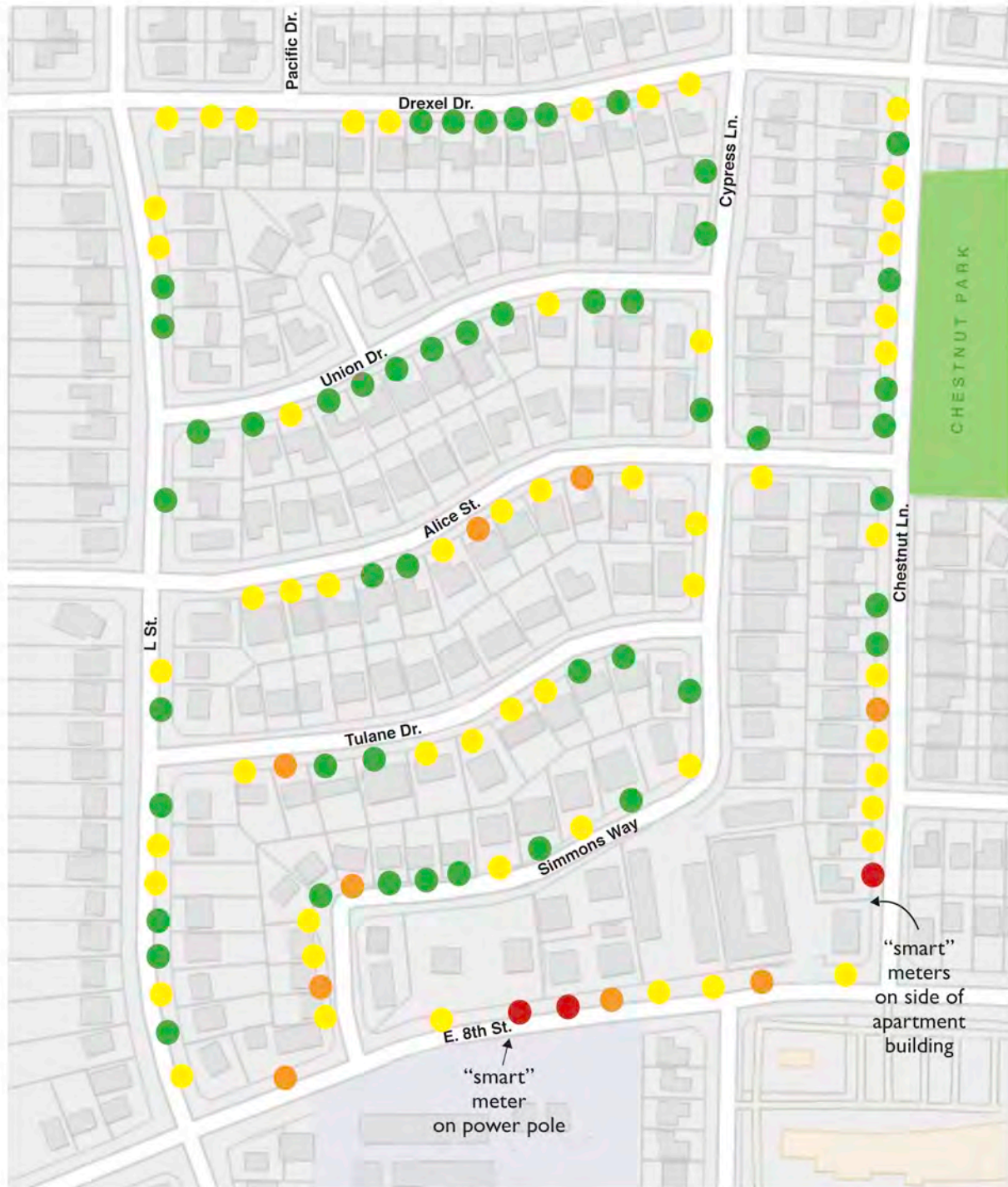
Radio Frequency Radiation in Backyards, Davis, California Claremont Drive to Drexel Drive, 2018 (estimated)



Radio frequency radiation in backyards estimated based on location of P.G.&E. smart electric meters and spot measurements in the backyards of five residences; data compiled by Larry Rollins, graphic design by Pat Suyama.

KEY: ■ 1.0 to 10.0 $\mu\text{W}/\text{m}^2$ ■ 10.0 to 99.9 $\mu\text{W}/\text{m}^2$ ■ 100 to 999 $\mu\text{W}/\text{m}^2$ ■ $\geq 1,000$ $\mu\text{W}/\text{m}^2$

Radio Frequency Radiation Along Sidewalk, Davis, California Drexel Drive to 8th Street, May 2018



One-minute samples; frequency range 100 MHz to 8 GHz; data Larry Rollins and James Trask, graphics Pat Suyama

KEY: 1.0 to 10.0 $\mu\text{W}/\text{m}^2$ 10.0 to 99.9 $\mu\text{W}/\text{m}^2$ 100 to 999 $\mu\text{W}/\text{m}^2$ $\geq 1,000 \mu\text{W}/\text{m}^2$

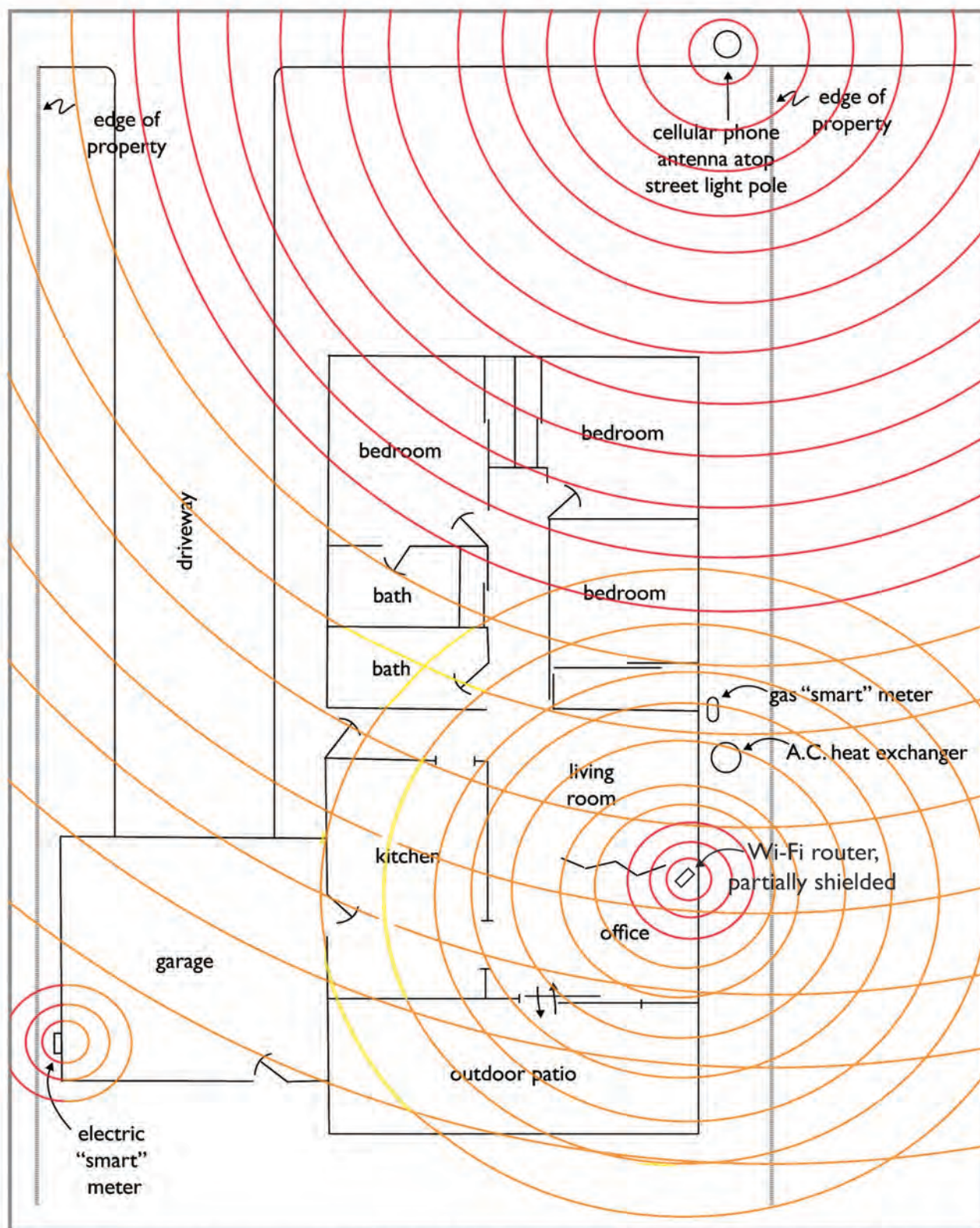
Radio Frequency Radiation Along Sidewalk, Davis, California 8th Street and Pine Lane, September 2018



One-minute samples; frequency range 100 MHz to 8 GHz; data Larry Rollins and James Trask, graphics Pat Suyama

KEY: ■ 1.0 to 10.0 $\mu\text{W}/\text{m}^2$ ■ 10.0 to 99.9 $\mu\text{W}/\text{m}^2$ ■ 100 to 999 $\mu\text{W}/\text{m}^2$ ■ $\geq 1,000$ $\mu\text{W}/\text{m}^2$

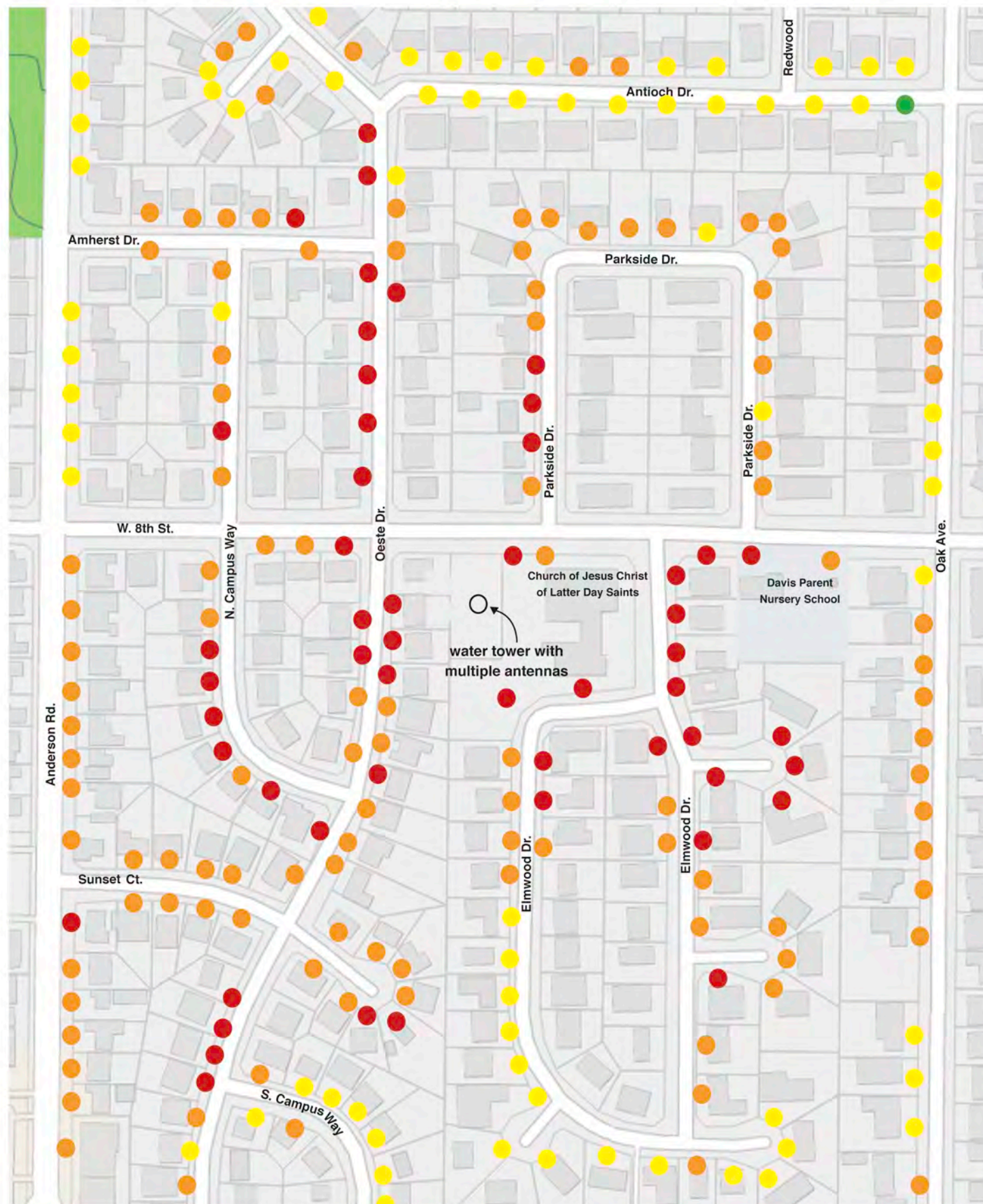
Microwave Radiation Inside House, Davis, California 8th Street and Pine Lane, May 2018



One-minute samples; frequency range 100 MHz to 8 GHz; data compiled by Larry Rollins, graphics by Pat Suyama

KEY: ■ 1.0 to 10.0 $\mu\text{W}/\text{m}^2$ ■ 10.0 to 99.9 $\mu\text{W}/\text{m}^2$ ■ 100 to 999 $\mu\text{W}/\text{m}^2$ ■ $\geq 1,000 \mu\text{W}/\text{m}^2$

Radio Frequency Radiation, Davis, California: Water Tower, November 2018



One-minute samples; frequency range 100 MHz to 8 GHz; data James Trask and Larry Rollins, graphics Pat Suyama

KEY: 1.0 to 10.0 $\mu\text{W}/\text{m}^2$ 10.0 to 99.9 $\mu\text{W}/\text{m}^2$ 100 to 999 $\mu\text{W}/\text{m}^2$ $\geq 1,000$ $\mu\text{W}/\text{m}^2$

Notes Regarding Radio Frequency Radiation (RFR) Measurements in 2018 in Four Residential Neighborhoods in Davis, California

October 3, 2019

Prepared for Electrosmog Awareness Project
by Larry Rollins, science writer, Davis, Calif.

General Comments

- We measured peak and average levels of total RFR along sidewalks
- We report on our maps peak levels measured during one-minute intervals
- Measurement instrument (two): Cornet ED-178S Electrosmog Meter
- Frequency range for this meter: 100 megahertz (MHz) to 8 gigahertz (GHz)
- Sampling rate for the meter: 10,000 readings per second
- Sensitivity range: 0.5 to 1,800,000 microwatts per square meter ($\mu\text{W}/\text{m}^2$)
- We calibrated our meters against factory-certified meters accurate to ± 3 decibels. The results demonstrated that our meters are reliable for the frequencies and intensities we encounter in neighborhoods. Our meters typically report numbers lower than the certified meters do.

Map: Claremont Drive to Drexel Drive

- The lowest measurement here is $2 \mu\text{W}/\text{m}^2$ (house on Drexel)
- The highest is about $7,000 \mu\text{W}/\text{m}^2$ (near cell tower on Claremont)

Map of Backyards, Claremont to Drexel

- Much radiation in backyards is due to PG&E's "smart" electric meters
- Caption on map describes how we made this map

Map: Drexel Drive to Eighth Street

- The two red zones are due to "smart" electric meters
- The orange zones may be due to WiFi or meters at nearby houses

Map: Eighth Street and Pine Lane

- Highest readings $4,000$ to $5,000 \mu\text{W}/\text{m}^2$ (near cell antenna)
- Of four residents we know living near the antenna, two have multiple sclerosis, and two others have diabetes.

Map: House at Eighth and Pine

- RFR exposure in bedrooms closest to street (and antenna): 2,500 $\mu\text{W}/\text{m}^2$
- RFR in third bedroom (at center of house): about 1,500 $\mu\text{W}/\text{m}^2$
- RFR in living room, near WiFi router (shielded to cut signal): 700 $\mu\text{W}/\text{m}^2$
- The resident of this house has diabetes. She also has had joint pain, leg cramps, dizziness, fatigue, nausea, headache, and other symptoms of microwave illness. She now sleeps in the living room to minimize her symptoms (bedrooms unusable due to high RFR).

Map: Davis Water Tower

- This is the highest-radiation neighborhood we have measured so far
- Tower has two omnidirectional antennas on top and sector antennas on its sides
- Exposure to RFR at 53 houses here exceeds 1,000 $\mu\text{W}/\text{m}^2$
- Twelve (of the 53) houses receive more than 5,000 $\mu\text{W}/\text{m}^2$
- Of those twelve, five receive more than 10,000 $\mu\text{W}/\text{m}^2$ (maximum 16,000 $\mu\text{W}/\text{m}^2$)
- Extensive tree cover on many streets here helps shield some houses from RFR

PHOTOS



Cell tower (monopole) on Claremont Drive. Nugget Market at left, CVS building behind antenna.



Cell antenna atop city-owned street lamp at Eighth Street and Pine Lane.



Davis water tower on Eighth Street near Elmwood Drive, November 2018. Two omnidirectional whip antennas and several smaller antennas are located on top of the tower. Numerous panel-style (sector) antennas are located below the tank, on the tower's sides.